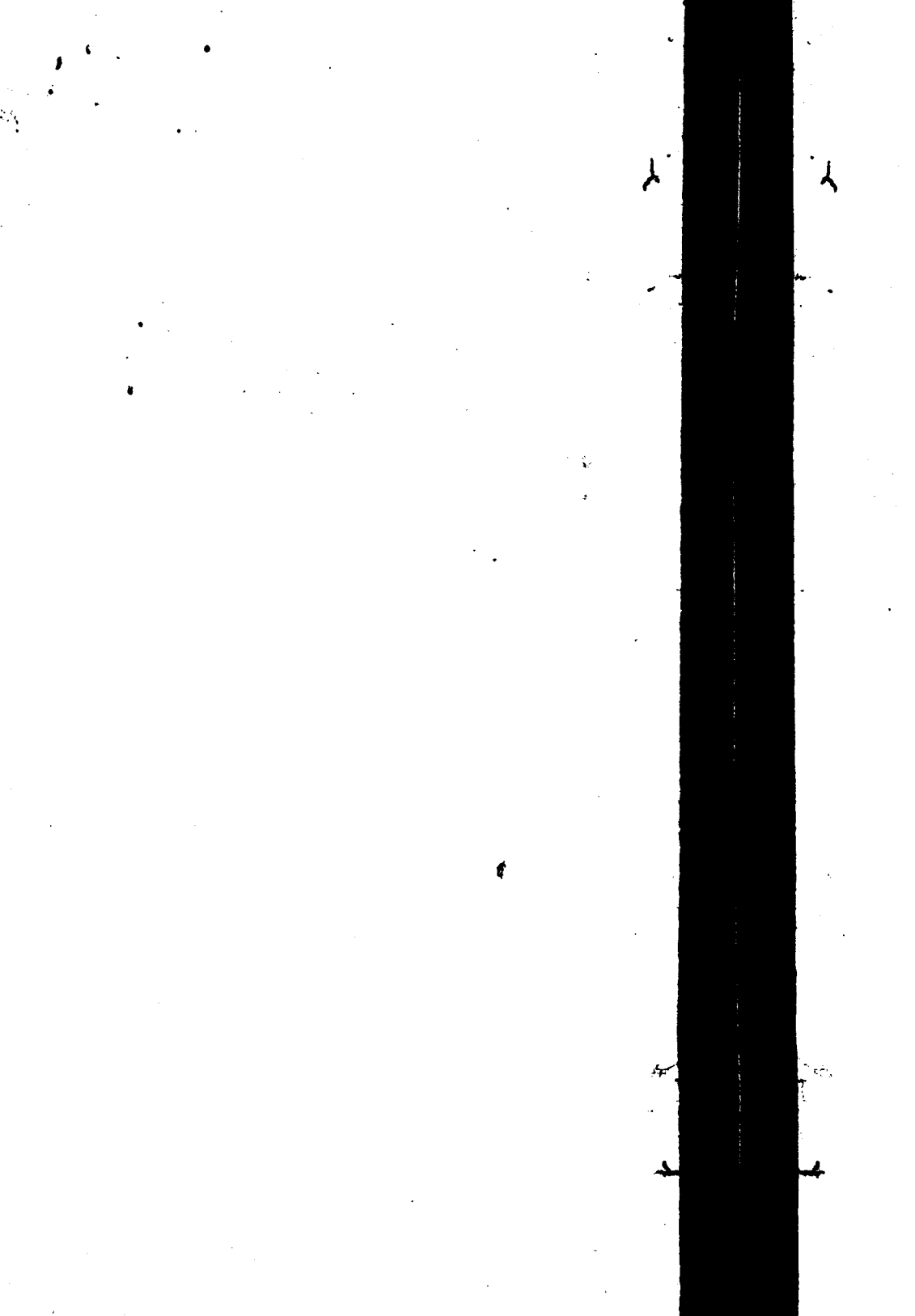

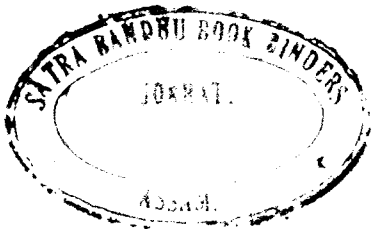
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The Agricultural Journal

OF THE UNION OF SOUTH AFRICA.

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Title Page and Index for Volume I.

The title page and index for the first volume of the *Agricultural Journal* of the Union of South Africa is published with the current issue, and all subscribers should receive a copy to enable them to have the volume bound. Any subscriber not receiving a copy enclosed with his *Agricultural Journal* would confer a favour by communicating with the Editor, Department of Agriculture, Pretoria. As regards the binding, subscribers will have to make the best arrangements they can locally, but we may add that any reputable firm of printers can arrange to do this at a fairly reasonable rate according to the quality of binding desired. Some correspondents have suggested that it would facilitate this being done, and the volumes kept as a permanent record and work of reference, if covers could be issued by the printers at a certain fixed rate. This subject has been discussed, and as there are several technical objections which make it impracticable it had to be dropped.

Correspondence.

There seems to be still a great deal of confusion in the minds of many of our correspondents as to the addressing of letters dealing with *Journal* matters. All subjects connected with subscriptions and publication should be addressed to the Government Printer, all subjects affecting advertising should be addressed to the Metropolitan Advertising Co., St. George's Street, Capetown, who hold the contract, and only subjects affecting the literary side of the *Journal* should be addressed to the Editor, Department of Agriculture, Pretoria. We are constantly receiving letters dealing with subscriptions, publication, advertisements, etc., which should go to the Government Printer or the advertising contractors, while letters asking for information are as frequently addressed to the latter, with which it is impossible for them to deal. It would save a great deal of trouble if correspondents could bear these details in mind, and would also expedite answers to their letters.

The Soya Bean.

As a subject of considerable discussion the Soya Bean has occupied a good deal of attention lately in very widely extended circles. The virtues and advantages of this crop for many purposes

have been fully dilated upon, and the more it has been studied the more it seems to impress itself as one of the coming crops of the future. In this issue we are in the position of being able to place before our readers some exceedingly interesting information on this subject, obtained at first hand by means of what appear to be fairly exhaustive experiments carried out by the departmental experimentalist staff in Natal. It is early yet to fully discuss the results so far obtained, but that they are more than satisfactory is very clear, and that they promise to lead to even more encouraging results in the not distant future is also fairly certain. What the practical farmer likes to see in reports of this description is, usually, the net cash results. When he is satisfied on this point he looks at matters a little closer. But in this case it is as yet early to expect commercial returns, even on a hypothetical basis, so we must be content to follow the experimentalists for the time being and take what profit we can from the results of their investigations.

One of the great needs of the whole of South Africa is what may be described as new crops. That is, something to vary the usual monotony of the field crops of the country and enable us to adopt some more economic methods of cultivation than those generally in vogue. In this direction the Soya Bean promises to prove helpful, for while it is apparently a commercial crop of some value for oil, with an apparently assured market for soap making and other purposes, it is also of value as a rotation crop for maize. The peculiar conditions it seems to demand are those which would seem to fit in very well with maize, and if this phase of the case can be demonstrated the Soya Bean must eventually become an important factor in many sections of this country where the maize crop is of great importance. Farmers near the coast belt in the south-eastern districts of the Cape would do well to give these experiments some attention, as they should prove of interest to them.

Heart Injuries in Cattle.

The article on Traumatic Pericarditis of Cattle in the current issue is worthy the attention of all who have to deal much with large stock. Cases are constantly arising of injuries such as those described causing death, and the fatalities being ascribed to something quite different. But this is not the only point of special interest about this matter, the more important is the moral which is to be deduced. These fatalities would not be nearly so common if people connected with farms and farming generally were more deeply impressed with the necessity of preventing such accidents and trained to treat the little carelessnesses which give rise to them with more seriousness. It is the bits of broken wire—sometimes fencing, at others baling—and the odd nails which fall from broken-down buildings or smashed-up packing cases which are the initial trouble. These are left about, get into fodder or bedding, or even get hidden away in succulent grasses near the homestead. The unfortunate animal picks them up and the next thing is illness and death. Now a good farmer or stockman is usually very careful about such matters as he knows the full danger of carelessness, but the average farm hand of this country or the coloured help in byre or stable knows nothing and cares less.

It is to these that attention should be given and every opportunity taken of impressing upon them the enormous risks which the stock run through the reckless and untidy habit of leaving small things lying about which may contain hidden dangers. There are farmers in South Africa who go so far as to make the farm servants carefully pick up every atom of litter on or near the werf, but these are few and far between, unfortunately. Their number would increase very considerably were it thoroughly realized that these scraps and litter so frequently contain the causes of serious losses in stock. And as to the fiend who is responsible for loose pieces of baling wire in lucerne or other hay bales—it is difficult to imagine a punishment sufficiently drastic for his offending: for that is the unpardonable sin.

Lamziekte and its Prevention.

The report on the tests of the Mayers alleged preventive for lamziekte appears in this issue, and it discloses the fact that the alleged preventive has no protective power whatever. As a matter of fact the final results rather tend to show that the animals treated by the Mayers method seemed to be more susceptible to the disease than those left severely alone to take the ordinary risks. In the case of the animals treated by Mr. Mayers the death-rate from the disease amounted to 5 per cent., while the death-rate among the non-treated animals did not exceed 2.5 per cent. The details of the report are quite interesting reading and should serve to check those enthusiasts who are always discovering new and effective remedies for every obscure disease in the country. Lamziekte is certainly a puzzling subject, and it seems destined to defy the investigators yet a while longer. So far the country has still nothing beyond the palliative treatment suggested years ago by the late Duncan Hutcheon, namely feeding with sterilized bonemeal and salt. The real worry about the matter is that this fails in its effects in some cases, and the disease is reported to get worse in certain sections as years go by.

Irrigation Advice.

All interested in irrigation should read the notice in the current issue, showing the distribution of the Union Irrigation Department throughout the country. In case of doubt as to where to turn for advice it is always safe to address to the Acting Director of Irrigation, P.O. Box 444, Pretoria. The great thing to remember is that advice is obtainable.

International Congress of Apiculture.

The following translation of a circular letter which has been received from Professor Perroncito, President of the International Congress of Apiculture, is published for general information:—

"During next September the Fifth International Congress of Apiculture will be held at Turin, and I should like South Africa to be represented by some distinguished bee experts, and I would accordingly be glad if you would interest yourself in the matter. If there are any other persons interested in apiculture who would like to send in a report to the congress on apiculture in South Africa, you will do the committee a great pleasure by bringing this matter to their notice."

Transkei Natives and Persian Sheep.

The attention of farmers and others who employ native labour from the Transkei territories is drawn to the fact that the introduction of Persian sheep into those territories is strictly prohibited under Proclamation No. 162 of 1910, and that the practice (followed by a number of employers) of paying natives with Persian sheep is undesirable as such sheep cannot be taken to their homes by the natives. It should be further noted that the prohibition includes cross-bred Persians as well.

Dates in South Africa.

In the course of a letter to the Acting Entomologist for the Union (Mr. C. P. Lounsbury), Mr. W. T. Swingle, of the United States Department of Agriculture, who was responsible for the introduction of selected dates into the United States (for which purpose he visited the Sahara), writes:—"Do you cultivate date palms in South Africa? This year we have begun to ripen our dates artificially, and the process is very simple and very easy, as you will learn when you see a copy of an article I propose to publish shortly on the matter. If you have any hot, dry regions in South Africa you ought to try dates. They will stand a lot of cold and are not injured by temperatures as low as 10° F. when once they get established. Some of the seedlings of our co-operators planted three or four years ago are now bearing excellent fruit. It is not necessary to import offshoots to get good dates." Mr. Swingle has lately shown that dates are a delicious fruit when fresh, and that they can be transported to distant markets in an immature state and then ripened by an artificial process.

Zebras as Transport Animals.

The following interesting report on the use of the zebra for transport purposes has been furnished by the Magistrate, Ubombo (Zululand):—"Dunn's team consisted of eight zebras, two of which are fully grown animals, two about three parts, and the remainder only half grown. The wagon used was of the light donkey class, and having a capacity of 1½ to 2 tons, the load weighed approximately 1½ tons." On one occasion, the Magistrate says, "the wagon started at the bottom of a steep incline, with a bad turn half way. The ground was wet and in some places slippery. It was a fair test of willingness and power, particularly the former, as it was commenced with a 'cold collar'. The zebras pulled in a determined and concerted manner, and in my opinion accomplished as much as eight ordinary mules would have done.

"In the sandy country, where it is one continuous pull, they seemed to be only able to do treks of two miles with half loads, and appeared to suffer more from hunger than physical exhaustion. After a feed they would resume the journey without hesitation. Had they been fed on mealies, which they eat readily, I am convinced they could have done longer treks. With regard to their staying capacity, I may mention that, on remarking once to a Dutch farmer that it seemed singular so little use was made of the zebra when they were in numbers in the high veld, he informed me that it was due to this lack of staying power, and that a pair he once owned were knocked up after a 30-mile journey.

"On a hard, level road Dunn's team travelled at the rate of 3 miles an hour. On two occasions the team, when grazing, got into touch with wildebeest and moved off with them, but were recovered by the wagon boys on foot. A donkey which is inspanned with the zebra is stated to be more addicted to stampeding than they are. The donkey appears to be immune from *ngana*. On an average road they trek about fourteen miles a day. The conclusions arrived at on the evidence furnished by this team, exclusive of the supreme quality of immunity from disease, are as follows:—They respond quickly to the whip when pulling, they are not given to plunging, but crouch down and pull steadily; they keep their condition without corn-feeding, and they appear more intelligent than mules or donkeys. Against these qualities may be quoted the lack of stamina, which was disclosed when working in the sandy veld, but this I think was mainly due to want of corn-feeding, for it seems barely possible for it to be a characteristic failing of the species, as they are of muscular build, although light-boned. As the scientists may pronounce it to be due to heredity causes, it may be remarked that it is singular that an animal which so readily discards its natural instincts to embrace domestication should yet be so tenacious of that one quality."

Coffee-Tea.

Mr. J. Medley Wood, Director of the Natal Botanic Gardens, Durban, writes:—"More than forty years ago, when the writer was residing on his farm, he had a small plot of coffee in bearing and a larger plot which had not come into bearing. It occurred to him that the young leaves which had to be removed after pruning might be utilized for making 'coffee-tea'. A small quantity was made, and a pound or two was exhibited at an agricultural show which was held in Durban and an 'honourable mention' card was awarded to him for the exhibit. After the closing of the show the tea was sampled at Mr. Robert Acutt's store, and most (if not all) of those who tried it liked it, some even preferring it to the ordinary tea of that day. Soon after this the writer sold his farm, and on account of his health removed to a higher district, so nothing more was done in the matter. An article, copied from the *Manila Bulletin*, has lately appeared in the *Tropical Agriculturist*. It is as follows:—'Coffee and tea have been so long known to the world, and have given so much delight to millions of people, that it seems to be a very singular statement to make, at this late day, that man has not yet availed himself of some of the most valuable properties of these plants. Such, nevertheless, appears to be the case, especially with regard to the coffee plant. The stimulating power of tea and coffee is due to what is known as theine or caffeine, but tea contains a large percentage of tannin, which is not a desirable component in a beverage, and coffee, while less rich in theine than tea, possesses other properties which give it flavour as a drink. . . . It is true that the leaves of the coffee plant are not only available for making a beverage, but they possess properties which make them in some respects more valuable than the coffee bean. In appearance and fragrance the dried coffee leaves very much resemble those of ordinary tea, an aromatic beverage is produced which is bitter to the taste, but not disagreeably so, and which contains almost as much theine as an ordinary tea, while there is a notable

falling off in the proportion of tannin. It has been suggested that this 'coffee-tea', though not quite so agreeable to the uneducated taste as either of the other beverages, may become an important article of diet, since it is admirably refreshing and restorative in its effects, and at the same time would not prove disagreeable to people who are unable to drink ordinary tea or coffee.'"

It will be noticed (Mr. Medley Wood proceeds) that the writer of the article quoted says "an aromatic beverage is produced which is bitter to the taste, but not disagreeably so". The coffee-tea produced by the writer in Natal certainly had no bitter taste, and its freedom from it was probably due to the care taken in its preparation. After the leaves had been sufficiently wilted they were taken to the house, rolled into balls with the hands, thus getting rid of the greater part of the sap, and were afterwards dried over a slow fire. This rolling process is, I understand, done in the manufacture of ordinary tea by machinery, and in the case quoted in the *Tropical Agriculturist* was probably omitted altogether. Coffee is still grown in some parts of Natal, and possibly in other parts of South Africa also, and as the leaves proposed to be used in the preparation of this coffee-tea are those which are removed in the processes of pruning and handling, it will be seen that the production of the coffee-tea will be a by-product, the only cost being the labour of manufacture.

Vermin Destruction.

The manager of Mr. Abe Bailey's Colesberg Farms Estate, Oorlogs Poort, Arundel, forwards a list of vermin destroyed on the estate during the six months ended 30th June. The figures are as follows:—Jackals, 154; lynx, 20; wild cats, 113; baboons, 24; eagles, 25.

Barley for Malting Purposes.

With reference to the note which appeared in the June issue calling attention to the fact that the South African Breweries, Limited, have imported a quantity of seed barley for distribution among farmers, the Acting General Manager of that company now writes that the notice has created such a demand for the seed that the stock of same has been exhausted. He adds that it is the intention of the company to distribute seed again next year, and the London office is being requested to arrange for larger supplies being sent.

Importation of Pedigree Stock.

The Union-Castle liner, "Cawdor Castle", recently landed two valuable consignments of English pedigree stock for Kimberley and Rhodesia. The first consisted of fourteen bull calves, eight months old; the famous roan Shorthorn bull, Fritz; and two other fine red Shorthorn bulls, Laurete Champion and Blood Orange. These were specially selected and purchased by Mr. L. E. Homan, and were consigned to the Bellsbank and Exploration Co., Ltd., Kimberley. It is the intention of this company to retain the animals for breeding purposes, as it purposes to deal largely in future with the production of butter and cheese. The company, it is of interest to note, has

acquired an estate of 130,000 acres. The second consignment was for Mr. Williamson, on behalf of Messrs. Whitfield & Co., auctioneers, Salisbury, and consisted of seven Aberdeen-Angus bulls, viz., Anotole, Touchstone of Leith Hall, Knight Errant, Lord Emblem, Prince Fabian, Aberdeen-Angus, and Demora Vineyard of Skillymarno; and six Shorthorns, viz., Prince Albert of Titaboutie, Diamond King, Lord Edwin, Spice Box, Uncle, and Diamond Prince, together with the well-known galloway, Lord Barclay. They were accompanied by three very fine Hereford bulls, viz., Staunton Comrade, Gipsy Boy, and Buccaneer. The latter were specially selected and purchased by Messrs. Antony Hope & Smith, and the others by Messrs. Reith & Anderson. It should be mentioned that the galloway, Lord Barclay, is the first of its kind imported into Rhodesia. The animals were all landed in the pink of condition, Messrs. W. H. Williamson and C. H. Mitchell (representing the Bellsbank Company) being delighted with their condition.

Fruit Export.

The South African Railways Administration has notified that it has decided forthwith to cancel the following paragraph (No. 3) of Clause 280 of its Tariff Book, relating to facilities for the export of fruit oversea:—"If desired, arrangements will be made for the shipment and complete disposal on the London Market of citrus fruits forwarded via Cape ports and via Lourenco Marques. The charge will be 20s. per ton (as above), plus the actual net cost to the Administration for seed freight, agents' fees, etc., in London."

Woolled Sheep and Cattle-Dipping Tanks.

Mr. J. F. McNab, Wool Expert (Orange Free State), writes:—On looking through the July number of the *Agricultural Journal* I came across a very interesting article written by Lieut.-Colonel H. Watkins-Pitchford, on "Dipping and Tick-destroying Agents." Whilst this article cannot be too highly praised from some standpoints, there are suggestions contained therein which give rise to the gravest apprehension on the part of those most keenly anxious about the development of the wool industry in South Africa. It has been proved beyond question that South Africa, given a fair chance, will produce wools equal if not superior to the bulk of Australian clips. Now in the article in question, on page 55, the following paragraph may be seen:—"Recognizing the inconvenience likely to be experienced by sheep farmers in the maintenance of two dips (one for sheep and one for larger stock), necessitating the use at times of two different dipping fluids, an endeavour was made to adopt the laboratory dip for use as a sheep dip."

I take it from the foregoing that it is meant to swim the sheep through the same dip as the cattle. If such is the case I cannot too strongly condemn it. In the first place, when cattle have been put through a dip a few times the water becomes naturally very foul from drainage, droppings, etc. For cattle this does not matter, as their covering is of no commercial value; with sheep in general their value lies in their covering. Hence it will be seen that it is a very

dangerous principle to recommend to the average farmer on account of economy. Sheep dipped properly in clean fluid of a reliable nature grow a better wool (providing that they are dipped with less than two months' wool on) than those not dipped. If, on the other hand, they are put through a foul dipping fluid the damage to the wool is very considerable, and a farmer may lose more on one clip of wool than would pay for two sheep dips ten times over. Apart from foulness on account of droppings, etc., any observant individual may notice that the water after cattle are dipped has a great number of hairs in it. Should the sheep follow the cattle through the dip they pick up these hairs, therefore inestimable damage results, as these hairs will not take the same dyes which are used for wools. When wool is intermingled with hair or kemp a wool buyer allows for from 20 to 50 per cent. reduction per pound, as it makes up into damaged cloths.

On page 76 mention is also made of dipping sheep for eighteen consecutive weeks with satisfactory results. As a promoter of good wool growing, I would consider the results anything but satisfactory. Scab may be killed with two dippings with a good reliable dip, so why should a recommendation be given for an eighteen weeks weekly dipping, seeing that apart from its being unnecessary it damages the wool to such a great extent. I cannot too strongly condemn dipping sheep in a cattle dip. I recognize the necessity for a cattle dip to destroy ticks, etc., on cattle, but a farmer must also have a different small dip for his sheep.

The Conformation of the Horse and some Defects of the Animal.

By A. Grist, Assistant Principal Veterinary Surgeon, Orange Free State.

The attitude of the horse when standing at attention should be as follows:—The head and neck are raised with fixed ears. The line of the face at an angle of about 60 degrees to the ground, and at a right angle to the neck, with the weight of the body distributed in proportion on all four legs. The fore legs should be vertical, or perhaps with a very slight slope back under the body. The point of the hock should be in a plumb-line with the buttock. It is said by some authorities that if the back line is continued to the fetlock it maintains a vertical direction; but I think if the hocks are placed in the correct position, this is not so. The neck or rein should be of fair length, longer in the saddle horse than in the draught animal, tapering neatly towards the head.

Height and Measurement.

The height of the horse is the vertical distance from the ground to the highest point of the withers, when the forelegs are vertical or nearly so, and the hocks are in a plumb-line with the buttocks.

The length of the body of the horse is the horizontal line from the front of the chest to a line dropped vertically from the point of the buttock.

Depth of chest is the vertical distance from the top of the withers to the bottom of the chest. Height at the croup: the vertical distance from the ground to the croup—highest point of the hindquarters.

The following are the measurements of Ormonde as a four-year-old and St. Simon a three-year-old:—Height at withers, 64½ inches or 16 hands ½ inch, 63¼; length of body, 61½ inches, 59½; depth from withers to brisket, 29 inches, 27¼; distance of girth place to ground, 35½ inches, 36¼; length of head, 24½ inches, 24. A racehorse is higher than he is long in the body, and the shire or heavy draught horse is longer in the body than in height.

Comparative Measurement.

In comparative measurements of height in the racehorse and draught animal the distance from the top of the withers to the brisket of the thoroughbred, when applied to the foreleg, will reach from the brisket to the bottom of the fetlock joint. In a well-bred hunter the same measurement would reach the middle of the pastern. In a heavy-weight hunter to the coronet. In an artillery gun-horse to the ground, or to put it in other words, the heavier the breed the shorter the limbs.

The comparative measurement at the croup of the horse with that at the withers shows that as a rule racehorses of the highest type are about the same height at the withers as the croup. The lower a horse

is in front, other points being equal, the rougher will be his paces for riding purposes, more especially when ridden on a level and down hill. The limit for thoroughbred in height is 16 hands 3 inches, while that of the heavy draught is 17 hands 3 inches. A useful height in this country for ride and driving work is 15 hands 1 inch. The measurements through the chest behind the shoulders vary from 16 inches (Arab) to 19½ inches in heavy-weight hunter. Careful selection of breeding, good feeding in the time of drought and winter, and healthy conditions of life have great influence in tending to increase the size of animals.

The mare as compared with the horse has a lighter neck, a broader pelvis, slacker in the loins, and is higher behind.

"ARCHBISHOP'S" MEASUREMENTS.

The following are the measurements of the thoroughbred horse "Archbishop", imported by the Government of the Orange Free State. I take these measurements as I consider him one of the most powerful and useful thoroughbreds imported for breeding general purpose horses:—Height, 15 hands 2¼ inches; forearm, 22 inches; girth, 71¼ inches; below the knee, 8¾ inches.

With regard to size the following should be remembered:—(1) The offspring of certain sires and mares are often abnormally small. (2) The first foals are often smaller than the subsequent ones. (3) The progeny of old sires are often lacking in height.

The length of the head, as a rule, is proportionate to that of the body (trunk), but it bears no fixed ratio to the length of the limbs, the proportion being 1 to 2½. The length of neck should be in proportion to the length of the forelimb, so that we find the neck of the blood-horse (thoroughbred) longer than that of the draught animal. The weight of the body should be in proportion to the size of the limbs; this applies more particularly to the saddle horse. The muscles and bone of the racehorse are smaller than that of the heavy draught horse.

If the forefeet of a number of animals of various breeds and sizes be picked up and the limb bent at the knee and lower joints, it will be found that the heel will almost in all cases touch the elbow at the same point. The cannon bone should be short in hunters and riding horses which have to carry weight, also in long-distance racehorses and steeplechasers, but this is not necessary in sprinting racehorses whose distance is five furlongs.

BONE.

The common term "bone" usually refers to the bone below the knee and hock. It varies in quality and size in different breeds. It should not be judged solely by reference to size. In the thoroughbred it is heavy and dense of structure, whilst in the underbred animal the bone is coarse, porous, and light.

It is important that the bone, especially below the knee and hock, should be large and of dense texture so that it may be able to resist a considerable amount of strain and concussion. This applies more especially to a horse which has to carry heavy weights and has to gallop on hard ground.

The measurement below the knee of a thoroughbred horse should be at least 8 inches.

The posterior line at the back of the tendons should run parallel, or nearly so, with the front line of the bone. The tendon should be hard, clean, and free from thickening.

CONFORMATION.

Head.—In the lighter classes of horses the head should appear lean. The muscles and blood-vessels should be clearly defined, covered by a fine skin. The bony prominences should be sharply marked. A fleshy large head is an indication that the animal is soft and wanting in quality and blood. The line of the forehead and nose is straight, concave, or convex. The latter, for which the name "Roman nose" is given, is ugly. The forehead should be broad; a good width between the eyes is usually a sign of intelligence. The forehead should be prominent, just above the brow-band, with well-developed muscle on each side; such is an indication that the animal has courage. The bone of the top of the head (the occipital crest) should be prominent, as it is the point of attachment for the strong ligament of the neck and important muscles. The ears should be upright, capable of active movement, fairly close set, closer at the points than at the base. The eye should be clear, with a dark pupil, fairly prominent, and the eyelids thin, with as few wrinkles as possible. The nostrils should be thin, flexible, and of ample capacity to allow of expansion. When the animal is at rest they should be partly closed. The lips should be lean and possess good power of movement.

The branches of the lower jaw should be wide apart at their angles, and the space between should be hollowed out and free from excess of tissue.

Neck.—The shape, size, setting on, and the carriage of the neck not only adds to the beauty of the animal, but materially assists in the power of speed and action. It should be of good length, comparatively thin from side to side, and carried well up in the chaser, hunter, and hack. The term "long rein" is applied to such a conformation, whilst the neck of the heavy draught animal should be shorter and thicker. This kind of conformation is a defect in the saddle horse, because it makes the forehand heavy and prematurely wears out the forelegs.

Ample length of neck well carried gives better support to the head and so relieves the hands of the rider of heavy-weight. An animal with conformation of this kind is more pliable, responds more readily to the touch of the rein, and is rendered easy of control.

The upper line or crest of the neck may be convex, straight, or concave (ewe-necked), and is longer than the lower line. There should be a slight depression in front of the withers where the neck comes out from the chest in the lighter bred horses. This dip is very faint or absent in the heavier class of horse and the muscles of the shoulder stand out prominently.

Body.—The body should be short and as deep as possible compared with its length and inclined backwards: the length of the animal should be made up with long, sloping shoulders and long quarters. The ribs should be well sprung, of good length, and inclined backwards—good depth of chest will allow for good length of shoulders. Roundness of the chest is necessary for good breathing power. A horse should be well ribbed up; if the last rib is short, flat, and little inclined to the rear, he is termed slack over the loins. There should only be space for two or three fingers between the last rib and the hip. Mares are not usually so well ribbed as geldings.

The withers should be high, sharp, and extend well back into the back, more especially in racers, hunters, and riding horses. Such withers are associated with long sloping shoulder-blades and strength

in the back and loins. In the more common bred horse the withers are usually situated low, are thick and heavy. The line of back and loins should be straight or with a slight rise to the croup. The loins should be as flat and broad as possible. The top line of the croup to the root of the tail should be convex. A straight line indicates weakness of the part. The flank should be well filled up. Hollow flanks are indications of a weak constitution. The tail should be set on high.

FORELIMB.

The term forelimb or foreleg is applied to that portion from the humerus to the foot. The thoroughbred, hunter, and riding horse require a lighter forehand than the harness horse. The shoulder-blade of the hunter and chaser should be long and oblique, not only to give speed, but to enable him to resist the jar in landing over a fence, also to prevent the jar on hard ground. That of the riding and light harness horse should be oblique and light to obtain sure-footedness. In these animals the shoulder should not be heavy at the shoulder points. That of the heavy draught horse should be heavy and may be more upright. The elbow should not be tied into the chest so as to give plenty of freedom. Though it is not imperative that a racehorse for short distances should have a powerful muscular forearm, the hunter or animal which has to carry heavy weight on the back should have well-developed muscle at this part of the anatomy. This latter also applies more particularly to the heavy draught animal.

When viewed from the side the front line of the forearm and that of the cannon bone should be almost straight.

The knee should be clean and well defined. When viewed from the front the knee should be broad, flat, and large.

Calf-knee is the term applied when there is a tendency for the knee to drop back. Such a condition is best viewed from the side. This formation is said to be a sign of weakness, as it causes undue strain to the ligament at the back of the knee, but it should not be considered a serious defect.

The overshot knee is generally due to overwork, but may be congenital.

Knee to fetlock.—The cannon should be perpendicular to the ground and should be of good width from the side view. The tendons at the back should be nearly parallel to the cannon bone, well defined, and stand out prominently from one another, with a distinct grove behind the cannon bone and between each other.

THE FETLOCK.

The chief points about this joint are: It should be flat from side to side, and when viewed from the side of the animal it should not be broad as compared with the width of the leg just below the knee. (Captain Hayes.) This joint should not be round. The lock of hair at the back of the fetlock is abundant in heavy draught horses and common half-breds, but is scanty in the blood-horse.

THE PASTERNS.

The pasterns of the thoroughbred, hunter, and saddle horse should be long and oblique; those of the heavier draught for slow work are upright and short. Where an oblique shoulder is necessary so is the sloping pastern. Both being required for fast work and hard roads,

the latter conformation, sloping pasterns, prevents concussion, so therefore is essential in the saddle horse. A horse with upright pasterns is stilty in his gait.

THE HOOF.

The horn of the wall and the sole should be thick, hard, and tough. The outside surface of the hoof should be smooth and the surface line straight. Its slope should be continued in about a straight line with the pastern. The heels should be open and strong, the bars well developed, so that the liability to corns and contractions of the heel of the foot is lessened. The sole should be convex, that is when it is placed on the ground. Feet with flat soles are predisposed to laminitis or fever in the feet. They should be of ample size: when too small they do not supply a good base of support, neither do they take sufficient grip.

THE HINDLIMB.

The chief function of the hindlimb is to propel the animal forward, though in addition it takes a share of the weight of the body. The pelvis or quarters should be long, the thigh short, distance from the stifle to the hock long; such an animal is termed "well let down". The cannon bone should be short and the pasterns long. It is said that good length of croup and pelvis and a horizontal position indicate speed—such was the conformation of Ormonde in these regions, whilst the quarters of St. Simon were oblique. When the conformation of this region is marked by great obliquity the horse is designed to employ great force at a slow pace, while with the croup disposed horizontally he is capable of developing great speed, but fails when called upon to carry weight or cover a long course. For light carriage work such a conformation may suffice, but it is not adapted for heavy draught. (Wortley Axe.)

Horses used on the turf should have the croup and pelvis placed as near the horizontal position as possible, while the hunters, cavalry, and other horses which have to carry great weight under the saddle should neither be horizontal nor too oblique in this region, but have an intermediary position between the two, whilst the heavy draught horse should have an oblique croup and pelvis.

THE THIGH.

The thigh should be well covered with muscle, for here lies the propelling power. For speed it should be short comparatively. The direction should be forward and inclined a little outwards; the latter position is necessary for the horse to clear the body when galloping. If the thigh is inclined too far forward, the limb is placed too far under the body, and the movement is impeded. Viewed from behind, the thigh should be broad and furnished with ample well-developed muscle; insufficient development forms a gap between the hindlegs; a horse with such a conformation is said to be split up. The direction of the stifle should be inclined outwards, sufficiently to allow the horse to clear the abdomen during movement. For speed it is necessary that the second thigh should be lengthy to give the horse a long stride. The gaskin should be broad viewed from the side, and the muscles well developed.

THE HOCKS.

The hocks should be large and strong, the outline clean and well defined. They should be placed directly under the centre of gravity

and well let down. The legs from the point of the hocks should incline a little under the body. If the legs incline much forward (sickle hocks) the formation is weakened, because the strain is increased on the ligaments and tendons situated in that region, by the angle being more bent. Undue concussion results from a hock with a straight conformation, and such joints are inclined to develop bog-spavin and thoroughpin, whilst an overbent or sickle hock frequently springs curbs. The hocks when viewed from the side should be wide. When viewed from behind the cap of the hocks should be straight. They should not be turned out, neither should they be turned in (cow-hocked). The bone immediately below the hock should be large; when it is small in this region the term "tied in below the hock" is applied.

DEFECTS IN RIDING AND LIGHT DRAUGHT WORK HORSES.

An animal without a fair share of blood is lacking in courage and is sluggish in his work. A large coarse head, small sunken eye, pig eye, a short thick neck in the saddle horse. Low withers, upright shoulders in the saddle horse, he is inclined to stumble and does not give comfort to the rider. Want of depth and width of the chest; ribs not sufficiently sprung, flat sided; long, weak, or hollow back, the formation is weak and will not carry weight; narrow slack loin; too much space between the last rib and hip. Forelegs very close together, forelegs which are not straight; tied in below the knee, calf-kneed. Short upright pasterns in a riding horse there is want of spring in the limbs; a horse with such a conformation is inclined to jar the rider. Turned out toes are liable to brush, turned in toes animal liable to stumble. Flat feet and low heels are predisposed to laminitis—inflammation of the sensitive laminar. Upright feet, termed blocky, with contracted heels, predisposed to naricular disease; small feet, brittle horn. Very bent hocks, very straight hocks, action which is not true and straight, such as crossing of the forelegs, brushing, striking, forging, etc.

The Show Season in Natal.

MARITZBURG AND DURBAN.

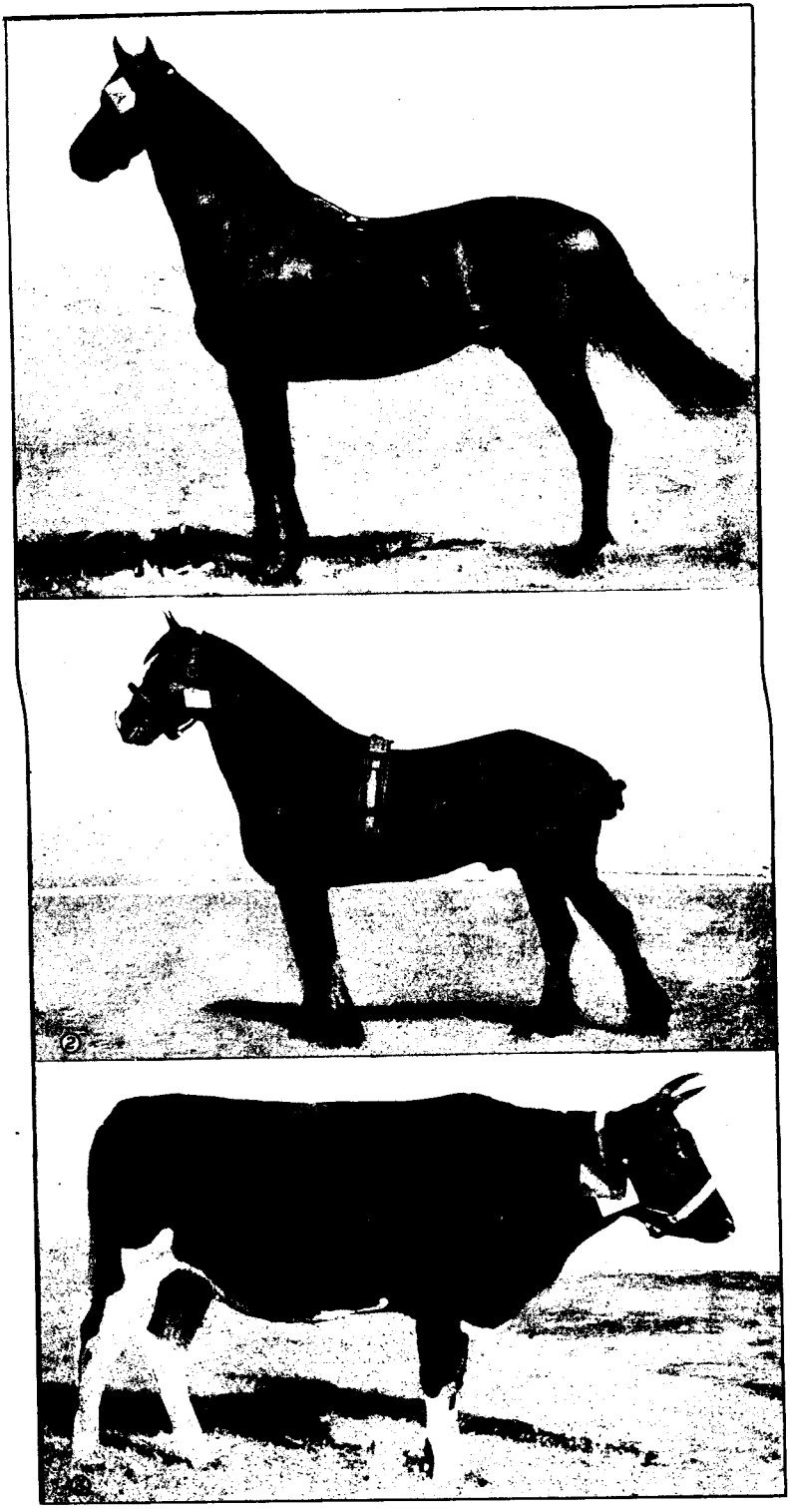
After a run of practically five months the South African agricultural show season has now come to an end, the last shows of importance in the series being those of the Royal Agricultural Society of Natal and the Durban and Coast Society of Agriculture and Industry. Spread over a considerable portion of the year, and held in all the more important centres of the country, the agricultural shows of South Africa represent a wide diversity of agricultural conditions—from viticulture and ostrich farming on the one hand to sugar and tea, tropical fruits, and wattle bark on the other hand. It is only necessary to run through the prize lists or the catalogues of the various shows to realize the great range of farming industries which South Africa enjoys and to realize something of the agricultural possibilities of the country.

Judged by the standard of former years—that is, since the incidence of East Coast fever forced the exclusion of the cattle section—it is hardly too much to say that the Maritzburg show was an unqualified success; and what added even more to its attractions was the fact that it was possible to include a cattle section this year. True, the entries could only be drawn from Maritzburg and the immediate neighbourhood, and the stock could not therefore be expected to be of too exacting a standard or the number of entries considerable, but at the same time the mere presence of cattle added that quality to the whole show which has been missing for years. Next year, doubtless, it will be possible to draw cattle entries from a wider radius. In every other direction the sections of the show showed some improvement at least upon former years, in some cases the improvement being quite marked. The horse classes were strong practically throughout, and with few exceptions competition was fairly keen. Sheep were represented chiefly by Merinos and Shropshires. In the former class the bulk of the competition lay between Mr. G. E. Blaker, of Estcourt, and Mr. R. J. Speirs, of Howick Rail; other competitors in this class were Messrs. C. J. King, of Nottingham Road, R. Garland, Mooi River, and W. Haines, Estcourt. The Shropshire Down class was a stronger one than the Merinos, and there was more competition. Messrs. P. D. Simmons (Mooi River), R. Garland (Mooi River), and G. Hutchinson (Balgowan) were the chief exhibitors. Other Down classes were very poorly represented indeed, and the competition in the long-wool, cross-bred, and fat sheep classes was not very keen. Among the stock sections of the show one of the most notable was that devoted to pigs. Here some fine animals were shown and the competition was keen. The principal classes were those for Yorkshire Whites and Berkshires. In the produce classes there was very little to complain of, and some very good quality was shown. This applies especially to mealies of which there was one of the finest shows, if not the finest, ever seen in Maritzburg. Twelve

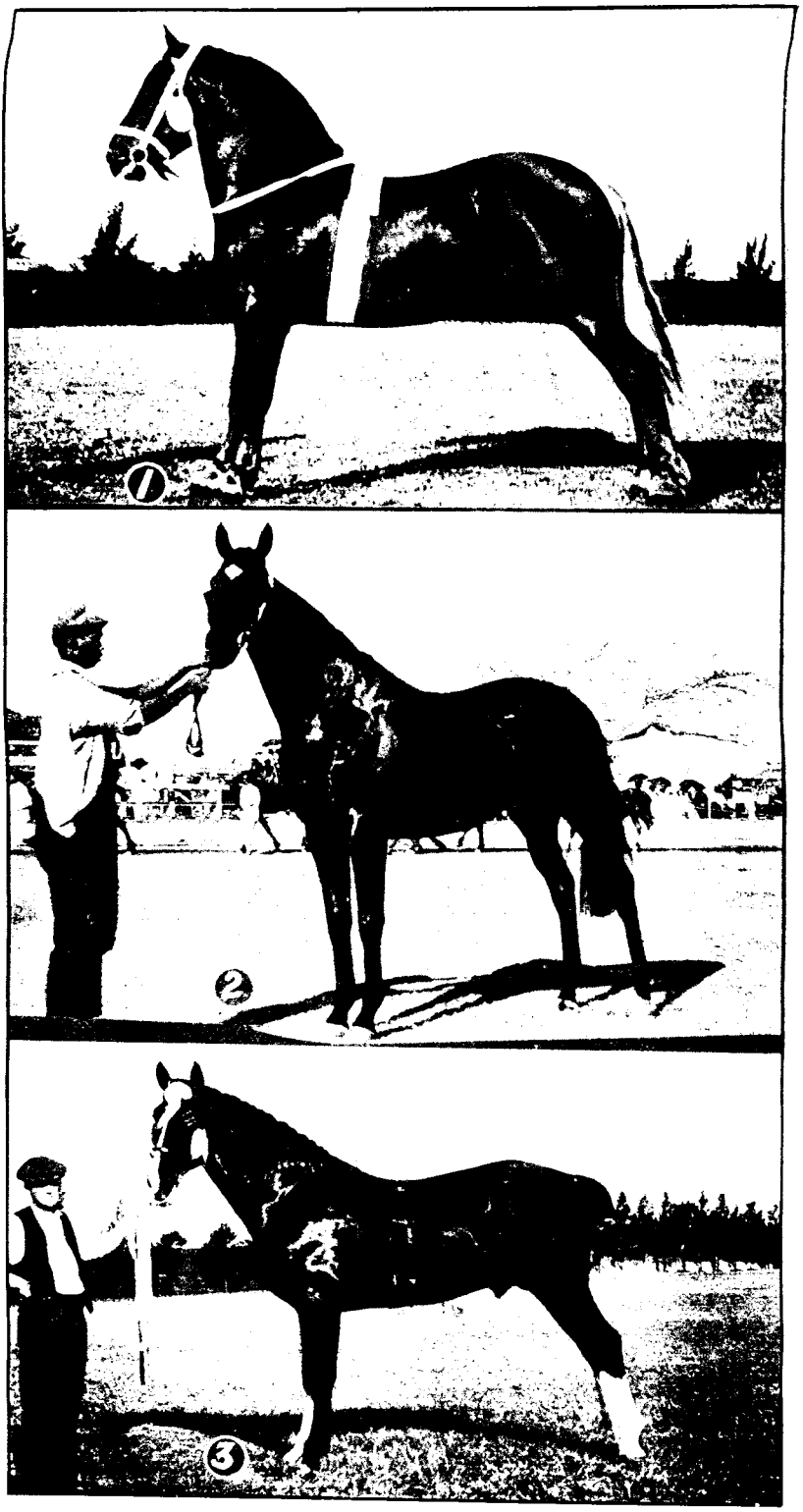
classes were devoted to this grain. The standard of quality was high and the competition very keen. Each year sees a notable improvement in the classes devoted to this grain. There was a good show of other grains, and as usual the root classes were good. The machinery section was a striking one and quite an improvement on those of previous years, even though the standard has generally been high. This year, of course, is not comparable with last year, as in 1910 several of the leading agricultural implement firms withheld their exhibits. This year, however, the representation was very good, apart from the excellent show of machines and implements which each firm managed to stall. A striking feature of the machinery sections of both the Maritzburg and Durban shows nowadays is the increasing number of oil engines and pumping apparatus shown. As regards oil engines, the variety of makes and styles, not to mention the wide range of prices, is gradually increasing, and the farmer who wishes to instal mechanical power for his stationary farm work has now little reason for not doing so. So far as Natal is concerned one would like to see more attention given to the needs of the Province in regard to motor tractors, but the difficulty is that the oversea manufacturer fails to give sufficient attention to the peculiar needs of the country.

Both the Natal Poultry Club and the Pietermaritzburg Kennel Club held their exhibitions in conjunction with that of the Royal Agricultural Society, and both achieved very successful results; the show of poultry especially constituting a marked improvement upon last year.

Another most successful show was that held under the auspices of the Durban and Coast Society of Agriculture and Industry. The attendance was splendid, since the show was held as usual in the height of the Durban "season", when there are large numbers of visitors from the other Provinces. Here again there was improvement, on the whole, on the previous year's show, but the improvement was not as evident in all the sections as it was in the case of the Maritzburg show. The horse section was a fine one as compared with previous years, and considerably outclassed that at Maritzburg, especially in the thoroughbred classes. The open class for mares was good, but there was not very much competition in the hackney classes, although there were some fine animals exhibited. Cleveland Bays and Yorkshire coach horses were not as good as they might have been, both as regards numbers of entries and quality of animals. In the case of cart horses, however, there was a marked improvement on last year. Both at Maritzburg and Durban the show of donkeys and mules was poor. Unlike Maritzburg, Durban had no cattle section, which, in a comparison between the two shows, rather detracted from the general attractiveness of the coast show. The sheep section was not as good as it might have been, and the Merino classes were a little disappointing as regards the quality of the animals. The best animals in these classes were the Wanganellas. On the other hand there was quite a nice show of Shropshires with a keen competition in most of the classes. As at Maritzburg the other Down classes met with a very poor response. Long-wools were good; and in the cross-breds there were two strong classes—ewes and lambs. There was a marked improvement in fat sheep as compared with 1910, both as regards numbers and quality of the animals. There was a good show of goats, but with no competition Mr. J. G. Bester having practically everything his own way. The display of pigs was not as good as that of the



1. "Corriecrian" (G. W. Nourse): Winner in the Thoroughbred Section.
2.—Mrs. John Black's Clydesdale Stallion "Scotland's Sentinel": Winner of 1st and Special Prizes in the Cart Entires.



1. "Morston Sunset" (W. G. Wingate): Special in Cart Horse Section, Stallions 3 years and over.
2. "Ace of Spades" (A. K. Murray): Winner of 1st in Class Thoroughbred Stallions 3 years and

Maritzburg show, taking it on the whole, but there was a better exhibition of Berkshires than was to be seen at the City. In both the boar and sow classes there were some very fine animals. In the bacon pig and porker classes competition was very keen. The machinery section was a fine one and very representative—perhaps a little more so than was the case at Maritzburg.

The Durban and Coast Poultry Club and the Natal Kennel Club held their annual exhibitions in conjunction with the agricultural show with successful results.

Some mention should be made of the improvements which have been carried out by the society in their grounds. These constitute, principally, a fine new hall, well built of brick, containing loose boxes for horses, which was this year devoted to the housing of the thoroughbred stallions, and a large new hall erected for the housing of the poultry section, the old hall being this year utilized for the large Union Government exhibit. Both at Durban and at Maritzburg the grounds have been improved in several directions, particularly at the latter centre, where the outdoor exhibits are now more conveniently arranged than they were in former years.

The Mayers Alleged Preventive for Lamziekte

REPORT ON THE TESTS.

For the purpose of testing the alleged preventive for lamziekte, offered to the Government by Mr. Mayers, of Grootfontein, 100 half-bred Friesland cows were selected from the herd of Mr. Leo, Smithskraal, Orange Free State, on whose farm the test was to be performed. Mr. Mayers arrived on the farm on the 2nd February, 1911, and informed me that the treatment consisted of a double inoculation. The first inoculation was done by him on the following day, 3rd February, 1911. Animals treated were branded on the right hip with the figure 4; 100 cows in all were inoculated. Ten days later, 13th February, 1911, these animals received the second inoculation, and portion of the brush was cut off the tail of each animal for identification.

The animals were then allowed to run with the other milk cattle and were placed in the river camp, this being the most healthy camp on the farm.

On the 28th February, 1911, eighteen of these cows were placed with the Government grazing lot in the middle camp, and with these latter animals were changed to the west camp on the 30th March, 1911.

On the 1st April, 1911, the balance of the treated lot, along with all Mr. Leo's milk cows, were changed to the west camp. The cases of lamziekte among the treated animals occurred after the animals had been to the west camp.

The following is a list of animals treated by Mr. Mayers which contracted the disease, with particulars noted after the first symptoms were observed:—

1. Black and white cow noticed stiff 23rd April, 1911. Became worse on following days: lamziekte diagnosed. Commenced to recover on 26th April, 1911, and was normal on 29th April.

2. Cow, stiff in front 25th April, 1911, not diagnostic. Recovered and was normal 28th April, 1911.

3. Black and white cow, with 4-months calf at foot. Off feed, milk supply diminished 4th May, 1911. Stiff in movements, noticed more particularly after walking some distance. Lamziekte diagnosed; recovered.

4. Black and white spotted cow (from lot with Government grazing lot). Lamziekte diagnosed from stiffness in movements on 25th May, 1911. Got gradually worse, and was unable to rise on 3rd June, 1911. Stretched out on side on morning of 4th June, 1911. Was propped on her brisket with stuffed sacks, fed, and watered daily. Refused food and water from 6th June, 1911. Died morning of 17th June, 1911.

POST-MORTEM REPORT No. 45.

	Temperature.	
	Morning.	Evening.
7th June, 1911	100.8	101.8
8th June, 1911	98.4	101.
9th June, 1911	98.8	100.4
10th June, 1911	98.0	100.2
11th June, 1911	98.4	101.4
12th June, 1911	97.	100.4
13th June, 1911	98.6	100.8
14th June, 1911	97.6	—
15th June, 1911	—	—
16th June, 1911	—	—
17th June, 1911	97.0	97.0

5. Black cow (from lot with Government grazing lot). Lamziekte diagnosed from characteristic stiffness 30th May, 1911. Seen on 2nd June, 1911, to be walking better. Slowly recovered.

6. Black and white cow. Noticed sick morning of 29th May, 1911. Lamziekte diagnosed. Unable to rise afternoon of 29th May, 1911. Symptoms of paralysis of hindquarters shown 30th May, 1911. Died during night.

POST-MORTEM REPORT No 39.

	Temperature.	
	Morning.	Evening.
29th May, 1911	98.4	101.
30th May, 1911	96.8	101.4.

7. Black and white cow. Noticed sick 29th May, 1911. Lamziekte diagnosed. Unable to rise 30th May, 1911. Symptoms of paralysis of hindquarters and tongue. Profuse salivation. Died during night.

POST-MORTEM REPORT No. 40.

	Temperature.	
	Morning.	Evening.
30th May, 1911	98.6.	102.4.

8. Black and white cow. Diagnosed "affected with lamziekte from characteristic gait" on 1st June, 1911. Unable to rise 4th June, 1911. Symptoms of paralysis of hindquarters. Died 9th June, 1911.

POST-MORTEM REPORT No. 44.

	Temperature.	
	Morning.	Evening.
7th June, 1911	99.8.	100.
8th June, 1911	99.0	100.6

9. Black and white cow. Noticed sick 2nd June, 1911. Diagnosis of lamziekte made. Still grazing and rising with difficulty 4th June, 1911. Very stiff in movements. Died during afternoon of 10th June, 1911, during my absence from the farm, and was too decomposed for post-mortem purposes on my return on 11th June, 1911.

	Temperature.	
	Morning.	Evening.
7th June, 1911	101.4.	99.8
8th June, 1911	—	100.2
9th June, 1911	—	99.6.
10th June, 1911	97.4.	—

From the foregoing facts it will be seen that on the date of writing the death-rate among the treated animals is 5 per cent. Comparing this with deaths occurring among non-treated (control) animals grazing under similar conditions we have the following data :—

Controls on the farm from 13th February, 1911—438. Deaths occurred as follows from lamziekte :—

24th February, 1911, one six-months-old heifer.
25th February, 1911, one year-old heifer.
3rd March, 1911, one seven months' old bull.
22nd April, 1911, two cows.
26th April, 1911, one cow.
1st May, 1911, one heifer.
20th May, 1911, one cow.
23rd May, 1911, one cow.
1st June, 1911, one cow.
4th June, 1911, one cow.

Total, eleven ; i.e. deaths from lamziekte in controls 2.5 per cent.

It will be seen from the foregoing that although the test has only been in operation for a period of less than five months, deaths among the treated animals from lamziekte have occurred to the extent of 3 per cent. more than was stipulated in the agreement between the Government and Mr. Mayers, and also that the treatment has absolutely no protective value against this disease.

A microscopic examination was made in each case of blood taken from the animal previous to death, but in each case the result was negative.

I attach herewith reports of post-mortems made on four of these treated animals. I thought it advisable to have my diagnosis confirmed in each case, so I asked two gentlemen who had resided for a considerable period in this district, and were well acquainted with lamziekte, to do so.

I attach a certificate signed by these two gentlemen and myself to the effect that the five treated animals referred to in this report died as a result of lamziekte.

D. T. MITCHELL.

Smithskraal, Orange Free State,
18th June, 1911.

We, the undersigned, hereby certify that we have seen the five animals treated by Mr. Mayers, referred to in the foregoing report, during the time that they were sick, and we are of the opinion that the animals were suffering from lamziekte.

We further certify that this disease was the cause of death.

K. LEO.
D. T. MITCHELL.
J. C. KOK.

Experiment Camp,
Smithskraal, Orange Free State, 19th June, 1911.

Experiments with Soya Beans in 1910-11.

By E. R. SAWER, Director, Division of Agriculture, Natal.

THE vital problem of arable farming in South Africa is to find a restorative crop for profitable growth in rotation with maize. This need for a staple legume, the recent general adoption of soya bean oil for numerous industrial purposes, and the establishment of soap, candle, and explosive factories in the heart of our principal plantation areas, has stimulated much local interest in the soya bean. The results of tests at the Cedara Experiment Farm, extending over a period of six years, have further shown that this plant, recently introduced to Europe as a hitherto unknown and valuable source of vegetable oil, finds favourable conditions for development in the climate and soils of Natal.* It was consequently determined last year to engage the interest of as many farmers as possible in an extension of the field experiments as a prior step to the establishment of the crop as a new staple. The scheme has fortunately enjoyed the hearty support of the Agricultural Union, the Maize Growers' Co-operative Association, and Messrs. Lever Bros., Ltd., by whose assistance seed for the planting of from 3 to 5 acre plots has been distributed to over three hundred farmers in all parts of the Union, together with descriptive bulletins and printed report forms. It is, therefore, the more regrettable that this undertaking should have coincided with a season of widespread drought and generally unfavourable conditions, which have seriously militated against the objects in view, and may have discouraged a minority of planters. Of the fifty reports which have at present come to hand, twenty-six indicate exceptionally dry weather or absolute drought during the months of January and February, which correspond with the principal growing period of the crop. Five reporters have suffered partial or total loss of the crop from hail, while abnormal rainfall at the close of the season has prevented harvesting in three cases. Only thirteen planters report fair or favourable conditions, while numerous recipients of seed have refrained from planting at all on the score of drought. In such circumstances it is encouraging to note a general determination to give a further and fair trial to the crop in a season of more normal conditions. In the meantime the following reports compiled at the different experiment farms in Natal afford some additional guidance to that deduced from earlier results, and it may be noted that the centres in question have been relatively fortunate in the matter of rainfall, the returns reflecting considerably higher precipitation than in the majority of districts. The soya bean crop at the Weenen Station, however, was seriously checked and damaged by hail on no

* Full details of the earlier experiments, with instructions for cultivation, were published by the writer in Bulletin No. 2, 1910—"The Soya Bean"—and in the "Cedara Memoirs", Vol. II, Report X, 1911.

less than three occasions, the early varieties suffering most, as the hail damaged the pods before the seed had matured.

The problems in connection with the cultivation of this crop for which solutions have been sought in our experiments include a determination of the behaviour of numerous varieties in different conditions of soil and climate, the most suitable combinations of fertilizers for different soils, the best time and distance for planting the crop, and the effect of different systems of cultivation upon the oil content which determines the value of the crop. Variety and manure tests have been made at all three farms during the past season, a time of planting test at Winkle Spruit, and a distance of planting test at Weenen.

VARIETY EXPERIMENTS.

An outstanding feature of the results of our experiments has been the marked modification of the different types of soya bean in response to the altered conditions of soil and climate, and too much stress cannot be laid upon the necessity for allowing any variety to reach equilibrium before being approved or condemned. Bulletin No. 98 of the Bureau of Plant Industry, United States Department of Agriculture, throws much light on the variability of this crop, and the warning therein issued is applicable to local findings. "The cultural varieties to be described differ in colour and size of seed, in height and habit of plant, and in earliness and lateness of maturing, all these characters, except the colour of the seed, varying greatly with climate and soil. . . . In the case of imported seed, where the habit of the parent plant and the conditions under which it grew are generally unknown, it is naturally difficult to tell when equilibrium has been reached. It is certain that many of the imported forms are much smaller in size and of earlier maturity the first year than they are the second year. Some have been discarded after one year's trial as 'too dwarf to have any value here', when subsequent trial has shown them to be decidedly large and prolific. Some have not shown their true value till the third year, and perhaps not wholly even then. In some of these importations the variation year by year has been so striking as to arouse the suspicion that the plants are not the same as those of the preceding crop." An extreme example is quoted in the above-mentioned bulletin. A yellow soya bean was received from France and first grown in 1902. In that year it reached a height of 12 to 16 inches, and ripened in ninety-five days, being classed as a "dwarf early yellow". In 1903 it reached 24 to 28 inches in height and required 120 days to reach maturity, and was therefore called a "medium yellow". In 1905 the average height was 30 to 36 inches, and 130 to 140 days were needed to reach the mature condition, thus placing it with the "medium late yellow", where it remains.

A similar case was observed at Cedara, when an early green (Guelph) type planted in 1905 grew to the height of 24 inches and matured in 100 days; replanted, the same type in 1908 grew to the height of 36 inches, and took 153 days to come to maturity. It will thus appear that no variety should be approved or condemned on the results of a single season's trials, but should be allowed by replanting to reach its equilibrium in the new conditions.

Considerable variation is also noticed in the size of the seeds of a given variety. As might be supposed, the pods and seeds produced

on plants dwarfed by drought, thick-planting, etc., are generally smaller than those produced on normal plants. In a given season the average size of the seeds may be markedly different from that of the preceding or succeeding season. The seeds from pods produced later in the season are very likely to be noticeably reduced in size.

In the absence of any sufficient supplies of local and acclimatized seed for general distribution, farmers' experiments were necessarily conducted with imported Manchurial seed of low standard. With a view to securing uniformity of conditions, the variety experiments at the Government farms were similarly conducted with freshly imported seed, local and acclimatized seed being only employed for larger revenual crops. The following table reflects the comparative returns from our three different centres.

Soya Beans.—Results of Variety Experiments, 1910-11.

Name of Variety.	Cedara.						Winkle Spruit.			Weenen.			Average.	
	Date Sown.	Date Harvested.	Height.	Average No. of Pods per Plant.	Average No. of Beans per Pod.	Yield of Beans per Acre.	Date Sown.	Date Harvested.	Yield of Beans per Acre.	Date Sown.	Date Harvested.	Yield of Beans per Acre.		
			in.			lb.			lb.			lb.	lb.	oz.
Austin	5/12/10	26/4/11	.	.	.	729	.	.	.	.	.	.	.	
Austin	21/10/10	28/4/11	10·8	44·0	1·7	84	.	.	.	.	.	.	.	
Black Beauty	21/10/10	17/2/11	11·1	21·6	1·30	490	20/12/10	10/4/11	568	10/11/10	28/2/11	930	662	10⅔
Brownie	21/10/10	28/4/11	30·2	59·3	1·89	1162	20/12/10	10/4/11	165	11/11/10	1/4/11	780	702	5⅓
Buckshot	21/10/10	3/2/11	10·0	9·5	1·54	70	.	.	.	10/11/10	4/2/11	200	135	
Butterball	5/12/10	20/4/11	.	.	.	202	.	.	.	.	.	.	.	
Chinese White	22/10/10	28/4/11	32·7	38·0	1·53	522	.	.	.	11/11/10	13/4/11	1300	911	
Early Brown	21/10/10	17/2/11	11·8	14·2	2·10	329	20/12/10	10/4/11	642	9/11/10	27/2/11	890	620	5⅓
Early Black Beauty	.	.	.	.	.	.	20/12/10	10/4/11	330	.	.	.	.	
Ebony	21/10/10	17/2/11 28/2/11	21·9	52·9	1·68	903	20/12/10	30/3/11	406	9/11/10	28/2/11	850	719	10⅔
Fairchild	21/10/10	17/2/11 23/2/11 28/2/11	17·2	29·5	1·85	525	20/12/10	30/3/11	204	10/11/10	28/2/11	1030	586	5⅓
Flat King	5/12/10	20/4/11	.	.	.	900	.	.	.	.	.	.	.	
Haberlandt	5/12/10	24/4/11	.	.	.	2000	20/12/10	10/4/11	770	9/11/10	28/3/11	880	1216	10⅔
Haberlandt	21/10/10	11/4/11	35·0	83·8	1·75	800	.	.	.	.	.	.	.	
Han Kow	21/10/10	28/2/11	13·2	46·9	1·77	490	20/12/10	10/4/11	581	9/11/10	7/4/11	960	677	

Hollybrook.....	21/10/10	28/4/11	15·0	45·6	1·94	343	20/12/10	10/4/11	806	10/11/10	28/3/11	530	559	10⅜
Hollybrook.....	5/12/10	26/4/11	.	.	.	364	.	.	.	.	.	.	.	
Hong-Kong	21/10/10	17/2/11	23·7	68·2	2·14	161	20/12/10	10/4/11	458	10/11/10	27/2/11	820	479	10⅜
Hosking.....	.	.	.	.	.	.	20/12/10	10/4/11	346	.	.	.	.	
Ito San.....	21/10/10	17/2/11	13·6	34·8	1·75	119	20/12/10	10/4/11	348	9/11/10	27/2/11	930	465	10⅜
Jet.....	21/10/10	17/2/11 23/2/11 28/2/11	22·8	28·8	2·12	616	20/12/10	30/3/11	644	9/11/10	28/2/11	1190	816	10⅜
Kingston.....	21/10/10	17/2/11	11·5	29·1	1·96	210	20/12/10	10/4/11	550	10/11/10	28/2/11	660	473	5½
Mammoth Yellow..	21/10/10	9/4/11	33·5	41·3	1·76	609	20/12/10	19/4/11	1191	9/11/10	13/4/11	1400	1066	10⅜
Merko.....	21/10/10	11/4/11	26·2	59·4	1·70	1022	20/12/10	10/4/11	198	9/11/10	7/4/11	970	730	
Meyer.....	5/12/10	26/4/11	35·4	45·2	2·60	1552	.	.	.	.	.	.	.	
Natal White.....	.	.	.	.	.	.	.	.	.	11/11/10	13/4/11	1330	.	
Okute.....	21/10/10	28/2/11	21·1	33·7	1·81	609	20/12/10	10/4/11	568	10/11/10	5/4/11	700	625	10⅜
Parson's Select....	21/10/10	23/2/11	10·0	27·5	1·69	210	20·12·10	10/4/11	440	9/11/10	7/4/11	860	503	5½
Peking.....	5/12/10	20/4/11	.	.	.	500	.	.	.	.	.	.	.	
Sakura.....	7/10/10	16/2/11 24/2/11	14·4	18·0	2·00	521	.	.	.	11/11/10	28/2/11	650	585	8
Sherwood.....	21/10/10	11/4/11	27·2	40·1	1·91	721	20/12/10	10/4/11	806	10/11/10	5/4/11	880	802	5½
Sutton's	21/10/10	17/2/11	14·8	26·0	1·68	192	.	.	.	11/11/10	1/3/11	660	426	
Taha.....	5/12/10	24/4/11	.	.	.	675	.	.	.	.	.	.	.	
Tashing.....	21/10/10	17/2/11	14·5	30·4	1·83	266	.	.	.	10/11/10	27/2/11	850	558	
Wilson.....	21/10/10	23/3/11	25·1	80·1	1·80	987	20/12/10	10/4/11	385	10/11/10	28/3/11	1100	824	
AVERAGE OF ALL VARIETIES.....	.	.	.	.	.	590	.	.	520	.	.	890		

Weather.—Climatic conditions were on the whole favourable at all three stations, with the exception of the incidence of hail on three occasions at Weenen. The last storm did considerable damage to the crop, which was then in pod. At Cedara, moreover, the early planting subjected the crop to a somewhat lower average temperature in its early stages than is conducive to maximum returns. As, however, the experiments covered 30 acres in all, the choice of planting season was necessarily determined by the exigencies of farm work later in the season. The maximum and minimum temperatures for each month during growth, and rainfall for the same period for the three stations, are given below:—

PERIOD OF GROWTH.

	Cedara.			Winkle Spruit.			Weenen.		
	Max.	Min.	Rain.	Max.	Min.	Rain.	Max.	Min.	Rain.
1910.			Inches.			Inches.			Inches.
October	91	34	4·55	.	.	.	.	.	.
November ...	90	36	2·63	85	44	4·60	95	46	1·42
December ...	94	43	5·88	89	55	6·26	96	47	4·51
1911.									
January	94	47	3·69	91	57	2·73	95	55	4·79
February ...	92	47	5·32	88	52	10·51	97	52	5·45
March	89	42	4·80	94	59	8·60	90	49	5·71
April	82	34	1·66	.	.	.	.	.	.
TOTAL RAINFALL			28·53			32·70			21·88

Soil.—At Cedara, except in the case of eight varieties, of which only a few seeds were secured, and which were consequently grown in very small plots in the garden, all the experiments were conducted on dry hill soil, west of the main avenue. This is a typical Cedara soil, light, easy to work, naturally poor, but much improved by seven years' systematic cultivation and manuring. It holds soil moisture tolerably well, forming a natural mulch of powdery dust during dry weather.

At Winkle Spruit the soils available for the experiment were of a very light, sandy character, containing, however, a fair percentage of lime, and easily worked. In this situation, despite wind-breaks of sugar-cane, drifting sand had a somewhat damaging effect on the growth of the crop.

At Weenen good alluvial soil with a fair percentage of potash and lime furnished relatively favourable conditions for the growth of the crop.

Manuring.—At Cedara the variety plots received a uniform dressing of 300 lb. high grade (37 per cent.) superphosphate, applied in the drills with the seed. The manure experiment has shown, however, in no uncertain manner, that this was not the most profitable application that could have been made, the use of potash being strongly indicated. The small plots in the garden mentioned above received kraal manure and 450 lb. of basic slag per acre.

At Winkle Spruit an application of fertilizers in different combinations to the earlier established manure plots, had had an extraordinarily deterrent effect on germination and subsequent growth,

owing to some undetermined reaction, and it was consequently decided to establish the variety plots without fertilizers.

At Weenen the plots received 200 lb. high grade superphosphate and 120 lb. of muriate of potash, given in the drills with the seed.

Planting.—At Cedara, owing to the anticipated rush of work entailed by bringing an extended area under cultivation this season, it was found necessary to commence planting operations somewhat earlier than the period which had previously been found to give the most satisfactory results, i.e. mid-November. This should be borne in mind, therefore, when considering the results of the crop. The minimum width at which the crop could be sown with the maize planter being 3 feet 4 inches, it was decided to employ other methods. Accordingly, the land was rolled and marked out with lines 30 inches wide, in which fertilizers were distributed by hand; the seed was then sown with a Planet Junior drill at the rate of 29 pounds per acre for Chinese White and Sakura. In the variety experiment this figure does not apply, as the weight sown varied with the size of the seed. Some varieties differ so greatly from others in this respect, e.g. Ebony and Han Kow, that double as much seed is required in some cases. The land was again rolled with the heavy Cambridge roller after the seed was sown.

At Winkle Spruit and Weenen the crop was planted in drills by hand.

Cultivation.—At Cedara, after planting, the land was continually stirred every few days with the anti-clog weeder as soon as the beans had made their appearance above ground. This operation was continued till the young plants had acquired the second pair of leaves, no damage being done to the crop by the implement. Subsequently inter-row cultivation was continued, the following implements being used in the order named:—Peg-tooth scuffler, broad-tined scuffler, shovel scuffler, and then one with flat knives, which did very good work. The crop was weeded once by hand. In spite of this constant cultivation, considerable damage was done by grass and weeds.

At Winkle Spruit and Weenen the plots were hand-weeded four times during growth.

Harvesting.—At Cedara part of the revenual crops were harvested for silage. This was done whilst the beans were still green in the pod, and before the crop had become too weedy. Reaping was performed satisfactorily with the Daisy Self-rake Reaper, laying the beans off in bundles, which were immediately carted to the silo. The stems of the soya bean become very hard and woody as maturity approaches, and it was found necessary to use the serrated knives for the reaper, with the cutter bar set as high as possible without leaving any pods on the stubble. Even this was found severe on the machine, and made it impossible to harvest the ripe beans in this manner. They were, therefore, pulled by hand and laid in heaps to dry prior to threshing.

At Winkle Spruit and Weenen the variety plots were similarly harvested by hand.

Observations on Varieties.—When reporting the above and associated results on the experiments at Cedara, the farm manager, Mr. W. C. Mitchell, contributed the following valuable notes, which are the result of very careful study of the crop at all stages.

"Experiments covered 30 acres in all, made up as follows:—

"Plot A1, 6 acres.—Chinese White variety, grown from Cedara-raised seed.

"Plot A2, 6 acres.—Mammoth Yellow variety, grown from seed raised last season at the Nel's Rust estate.

"Plot A3, 6 acres.—Sakura variety, grown from imported seed.

"Plot A4, 6 acres.—Testing 22 varieties.

"Plot A5, 6 acres.—Devoted to an experiment with manures.

"While the bulk of Plots A1 and A2 were harvested for silage, a few lines in each were left to mature a crop of grain. These were duly harvested, and yielded as follows:—

"A1. Chinese White (seed produced on Cedara the previous season), 522 pounds per acre.

"A2. Mammoth Yellow (seed produced at Nel's Rust the previous season), 436 pounds per acre.

"A description of these two varieties will be found under Plot A4.

"A3. Six acres sown with Sakura variety, imported seed. This is one of the standard varieties for the expression of oil. Belongs to the yellow type with hilum varying in colour from yellow to dark brown. Beans are fairly round and plump, but this is hardly a suitable variety for general cultivation in Natal whilst it retains its present dwarf type, which renders it particularly liable to damage from weeds. Takes four and a half months to mature, and produced only 521 pounds dry beans per acre.

"A4. This was devoted entirely to a test of varieties, many of which were under trial for the first time in South Africa, and although it is impossible to condemn or recommend any variety from the results of the first season's planting from imported seed, there is no doubt that much valuable light has been thrown on the question of variety.

"At the outset it must be stated that the results are somewhat disappointing as regards yield in most of the varieties, but having in mind the great improvement which is sometimes seen in soya beans after growing same for two or three seasons in a fresh climate, and when equilibrium has been reached, it is worth while giving all the varieties another trial.

"One particularly pleasing feature of this test is the striking improvement in size of seed seen in nearly every sample reaped when compared with the original.

"Dividing the varieties under trial into the usual colour groups, they appear as follows:—

"1. Black seeded.—Ebony, Kingston, Fairchild, Jet, Wilson, Han Kow, Black Beauty, Buckshot, Peking, Flat King.

"2. Brown Seeded.—Hong-Kong, Brownie, Early Brown.

"3. Green Seeded.—Parson's Select, Tashing.

"4. Greenish-yellow Seeded.—Austin, Okute, Haberlandt.

"5. Yellow Seeded.—Ito San, Sakura, Sherwood, Butterball, Merko, Sutton's, Chinese White, Hollybrook, Yellow Mammoth.

"6. Mottled Seeded.—Taha, Meyer.

"In the above a few varieties are included which were grown on very small areas in the garden owing to lack of seed.

"The following descriptive notes of the several varieties have been compiled. They are taken, as in the table, in alphabetical order, to permit of easy reference.

"*Austin.*—A good, medium-sized bean, nearly round, plump. Considerable variation occurs in colour between the original seed and the resulting crop, the former being of a decidedly greenish shade, whilst the latter contains a big percentage of yellow beans—quite 60

per cent.—and the remainder are of a much paler green than the original. This may be considered a more promising variety than the actual yield, as shown in the table, indicates, as defective germination of the seed resulted in a very poor stand of plants. The height of the crop, however, is against it, as weeds are much more likely to dominate and injure the dwarf-growing types.

"*Black Beauty.*—A jet black bean, which shows immense improvement in the new crop when compared with the sample of original seed, being 50 per cent. larger. Its yield, however, is not heavy, and it is of a dwarf type, consequently not so desirable as some others. The beans are somewhat similar to Buckshot, but not quite so large, whilst the crop takes some fourteen days longer to mature.

"*Brownie.*—One of the most promising varieties cultivated during the past season. Shows considerable improvement of type. Original seed is of a dull brown colour, with light-coloured hilum, and considerable bloom, much adulterated with white and green seeds. Crop harvested is of a very nice quality, and beans are larger than the original seed. Bear very little bloom, but otherwise are similar. Plants average 30 inches in height, which renders them very suitable as a general-purpose bean, either for fodder or grain. Yield was the highest of any variety in the larger plots, viz., 1162 pounds per acre.

"*Buckshot.*—A very early black bean of dwarf habit and poor yield. Beans are large, oblong, and slightly flattened. Unsuitable at present for cultivation in Natal.

"*Butterball.*—A very fine bean of the yellow type. Only a small quantity of seed was available and the hundred and thirty-fifth part of an acre only was sown, which yielded very badly. However, a further trial should be given this year as sufficient seed has been obtained to sow one-twentieth part of an acre. The beans are nearly round in shape, of a pale yellow colour. New crop exhibits a slight tendency to acquire a wrinkled skin; they are liable to break easily in the thresher, which should preferably be of the beater type.

"*Chinese White.*—Over twelve acres have been seeded with this bean at Cedara during the past season, and although returning a very poor yield of grain it has certainly much to recommend it for fodder purposes. In appearance, both the bean and the crop are very similar to Mammoth Yellow, but it hardly yields as well. Seeds are of a pale yellow colour, with light brown hilum. Nearly round, medium size, full and plump. Part of the crop was ensiled, mixed with the Mammoth Yellow variety, producing a very fine silage at the rate of five tons per acre.

"*Early Brown.*—Dark reddish brown in colour, covered with a greyish bloom, fairly plump. Nearly round in lateral view, but somewhat flattened. Sample adulterated with yellow and light green coloured beans. Crop reaped compares unfavourably with the original seed, colour of bean is lighter, and seems to have been considerably damaged by the wet weather prevailing at time of harvesting. Much the same size as the original seed.

"*Ebony.*—Jet black. Original seed heavily covered with a dull grey bloom, but this is absent in the new crop, in which the beans are much larger than the original. Shape somewhat elongated and fairly plump. Slightly damaged from weather. Crop takes somewhat over four months to mature, and is of fair average height, viz., nearly two feet. Yield good in comparison with other varieties.

"*Fairchild.*—A black bean; only a moderate yielder, being about equal in this respect to the White Sakura. Beans large, oblong, and slightly flattened. Quality poor and growth somewhat short. Several other better varieties.

"*Flat King.*—Jet black in colour, and with very little bloom. Large, flat, and oblong, very similar to Han Kow, though somewhat larger. Owing to lack of seed, only a few plants were grown. Might be given a further trial.

"*Haberlandt.*—Beans are very similar in colour to Austin, but slightly smaller. Although the original seed is of a uniform dull green colour, the crop appears to contain two distinct varieties, one a lighter green than the original seed, the other a yellow similar to Chinese White. Nearly round, though somewhat flattened at sides, and nicely plump, the beans make an attractive sample. A small plot in the garden yielded at the rate of 2000 pounds per acre, but the larger plot grown under field conditions only returned 800 pounds per acre. Is a good fodder bean, growing to a height of three feet. Worthy of more extended cultivation.

"*Holybrook.*—A yellow bean resembling Yellow Mammoth, but in habit is much more dwarf, only averaging 15 inches. The yield also is not as heavy, and it takes slightly longer to mature.

"*Hong-Kong.*—This bean provides a most extraordinary example of variation from the original seed, much more noticeable in some varieties than others. In the current crop hardly a bean resembles the original seed, which is medium small, of a dark buff colour, slightly elongated, and flattened. The crop harvested contains beans of yellow, buff, and through all shades of brown to black. Size also varies considerably. Of all these it would be impossible to say which would breed true to type. The crop proved a very poor yielder, and is not considered worthy of a more extended trial.

"*Ito San.*—A yellow bean of medium size, slightly elongated, but very little flattened. Crop harvested ripened irregularly, consequently sample is much damaged by shrivelled, bad seed. Probably this should have been left some little while longer to mature. Takes four months to complete growth, and is of a rather dwarf habit. Yield very poor indeed.

"*Jet.*—A black bean, as the name implies. Fair size and quality. Hardly grows high enough, but may improve in this respect with further cultivation. New seed is slightly fuller than the original sample. Much less bloom on the new seed than on the old.

"*Kingston.*—A black type which has done badly. Original seed was obviously adulterated with other black varieties, making hand picking of seed a matter of great difficulty. Otherwise seed was good, quite small, round and plump. New crop is much damaged and shrivelled, adulterated with yellow, brown, and green seeds. Practically worthless and unsuitable for further cultivation.

"*Merko.*—Of the yellow type, and standing second to Brownie as far as yield is concerned. The crop is of very fair sample, beans being considerably larger than the original seed. Beans slightly elongated and flattened, with hilum varying in colour from very light to very dark brown. Grows to an average height of over twenty-six inches, and will probably prove suitable for more extended cultivation.

"*Meyer.*—This belongs to the mottled group. The bean is brown, splashed with black streaks running in curved lines more or less parallel with each other and with the contour of the bean when

seen in lateral view. It is to be regretted that only a small sample of seed was available for sowing, enabling us to plant only the hundred and thirty-fifth part of an acre. This yielded at the rate of over 1500 pounds per acre, but on such a small area this must not be taken as a definite indication of the yield of the variety. Plants are nearly thirty-six inches long, but show a tendency to become trailing rather than stand erect. Should certainly be tried on a larger scale.

"*Tashing.*—One of the green type. Crop is disappointing both in yield and quality. Original seed was very similar in size and appearance to the Guelph or Medium Early Green, a variety which previously has done remarkably well at Cedara, but of which no viable seed was obtainable for last season's planting. The Tashing, however, is rather less yellowish in shade than the Guelph, and exhibits less bloom. The yield of Tashing beans was only 266 pounds per acre, and at least 75 per cent. of these are perfectly valueless, being shrivelled and spoilt by weather. Plants are dwarf in habit, and the crop cannot be recommended for further cultivation.

"*Wilson.*—A black bean of some promise. Yield was very fair for the first season—987 pounds per acre—and size of beans has much improved on the original. It is interesting to note that the heavy bloom found on all the imported black varieties is almost entirely absent in the new seed. This variety is very similar to Jet in appearance, and grows some two inches higher.

"*Mammoth Yellow.*—Colour as the name implies. A bean of very fair sample, plump, slightly elongated, and above the average in size. New crop shows an improvement in this respect as compared with the original. It is an excellent bean for fodder purposes, attaining a height of nearly three feet. Some excellent silage has been made from this variety during the current season at Cedara."

The comparative figures given in the table clearly indicate that while some of the varieties show a satisfactory adaptability to the conditions obtaining alike on the Natal coast, in the warmer of our upland districts, and in the cooler areas characterized by Cedara, other varieties are more exacting, and have only given relatively good returns at one or two centres. Thus the Haberlandt deserves extended cultivation throughout Natal, while types with extensive development and long-growing period, such as the Mammoth Yellow, the Natal White, Chinese White, and the Jet, give better results as grain producers in our warmer areas, and would preferably be grown as forage crops in the climate of Cedara. The Brownie and Merko, on the other hand, have yielded excellent returns of grain in the cooler climate of Cedara, but have failed at Winkle Spruit, and have given relatively unsatisfactory results at Weenen.

At the last-named centre, an average return of approximately 4½ muids from twenty-four varieties, including relative failures, and despite hail damage, can hardly be regarded as unsatisfactory, and from six new types yielding more than five bags from freshly imported seed, it should be possible to obtain by acclimatization and selection prolific strains adapted to different climates and soils from those here obtaining.

It will be noted that the Sakura variety, planted with seed taken from the consignment distributed for experiment throughout South Africa, comes very low down the list of averages, and it is confidently believed that very superior results will be obtained when sufficient

quantities of acclimatized seed of other and approved types are available for a similar purpose.

MANURE EXPERIMENTS.

When grown as a rotation crop with maize, the soya bean would normally secure its requirements of fertilizing ingredients from the residues of manures applied to the cereal. It has been thought well, however, to establish by actual experiment the response of the crop to specific fertilizers. At Cedara, Plot A5, an area of six acres, was marked off into seventeen sections, which received the manures given in the following table. Owing to an error in harvesting, the weight of stalks in sections 1 and 2 could not be separately determined:

MANURES, IN LB. PER ACRE.	WEIGHT OF CROP PER ACRE.	
	Stalks.	Beans. Lb.
Section 1.—No manure	1725	725
" 2.—Amm. sulph. 150, super. 300, potash 100		675
" 3.—Super. 300, mur. potash 100	3750	1225
" 4.—No manure	2750	625
" 5.—Amm. sulph. 150, mur. potash 100 ...	2150	500
" 6.—Amm. sulph. 150, super. 300	2350	575
" 7.—No manure	2100	500
" 8.—Super. 300	2000	450
" 9.—Amm. sulph. 150	2050	475
" 10.—No manure	1600	400
" 11.—Basic slag 300, mur. potash 100 ...	2650	650
" 12.—Basic slag 300, mur. potash 100 ...	2500	675
" 13.—No manure	1600	425
" 14.—Mur. potash 100	1300	700
" 15.—Basic slag 300	1750	400
" 16.—No manure	1050	225
" 17.—Basic slag 300	1700	525

The outstanding features of the above results are the deleterious effect of the application of nitrogenous manures, and the consistently satisfactory returns to the use of potash. It has been repeatedly found, in the course of our experiments at Cedara during a period of eight years, that ammonia salts, when brought into contact with seed in the drills, has a markedly deterrent effect on germination, which is enhanced in the case of leguminous crops by subsequent failure on the part of the plants to make adequate root and nodule development, which only ensue where there is marked deficiency of soil nitrogen. This issue was confidently anticipated, and the ammonia plots were inserted in the experiment to further demonstrate the absence of any necessity for providing nitrogen to the legume. This effect, moreover, is not confined to any one group of crops, for it has been found that in the soils of Cedara better results have been obtained without nitrogenous manures in the case of maize, potatoes, and other staples. Such a result is attributable to the rapid fixation of atmospheric nitrogen by independent soil bacteria, whose activity is stimulated by the generous rainfall and warmth of our growing season.

If the above influence of the ammonia salts be eliminated, it will be seen that consistently satisfactory returns were obtained from all plots to which potash was applied. The low yield of Plot 8 can only be attributed to local soil irregularity or to the influence of the acid phosphate, as both Plots 15 and 17 gave satisfactory increases to phosphoric acid in the shape of basic slag.

Experiments with Soya Beans.

Plate I. A Crop of Soya Beans at Cedara 1909-1910.

Plate II. A Crop of Soya Beans at Cedara, 1910-1911.

Plate III. A Soya Bean Plant, showing botanical characters.

Plate IV.

Roots of a Soya Bean Plant, showing nodular development.

Experiments with Soya Beans.

Plate I. Some of the Soya Bean Varieties at Cedara, 1910–1911.

Experiments with Soya Beans.

Plate VI. Some Soya Bean Varieties at Cedara, 1910–1911.

Experiments with Soya Beans.

Plate VII. Some Soya Bean Varieties at Cedara, 1910-1911.

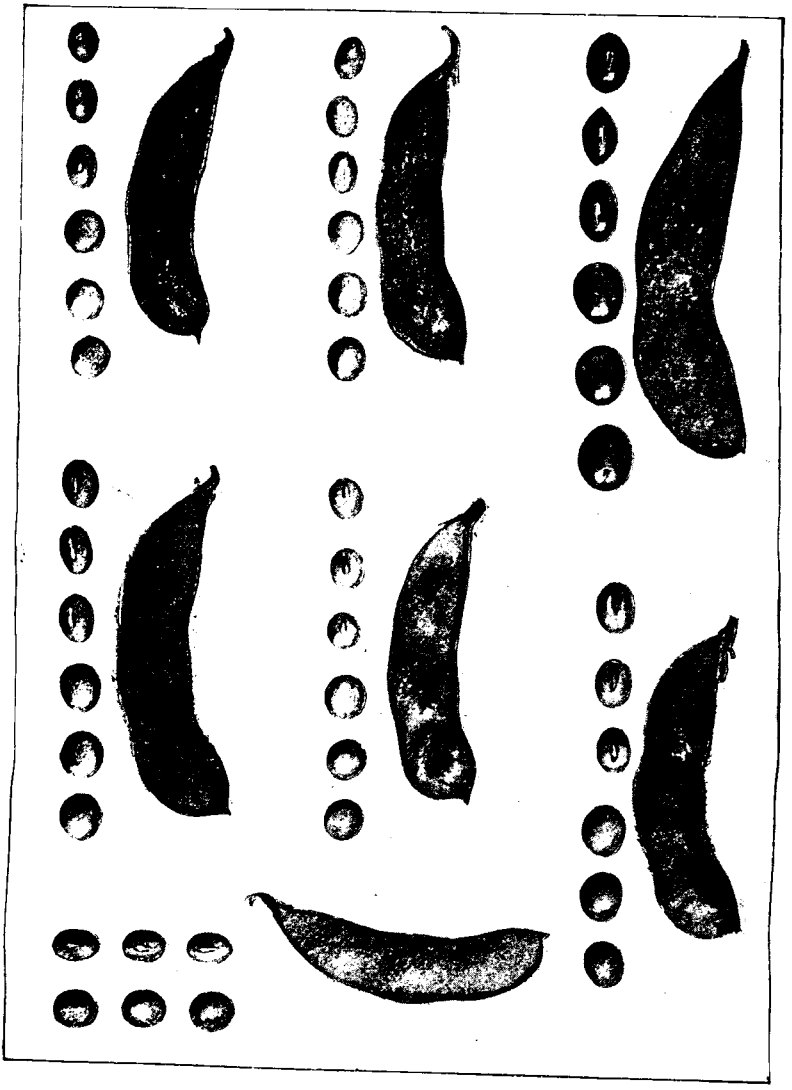


Plate VIII. SEEDS AND PODS OF SEVEN VARIETIES OF SOYA BEANS.

Natural size, reading from left to right, top row: Guelph, Ito San, Buckshot; second row: Austin, Hollybrook, Haberlandt; bottom row: Mammoth.

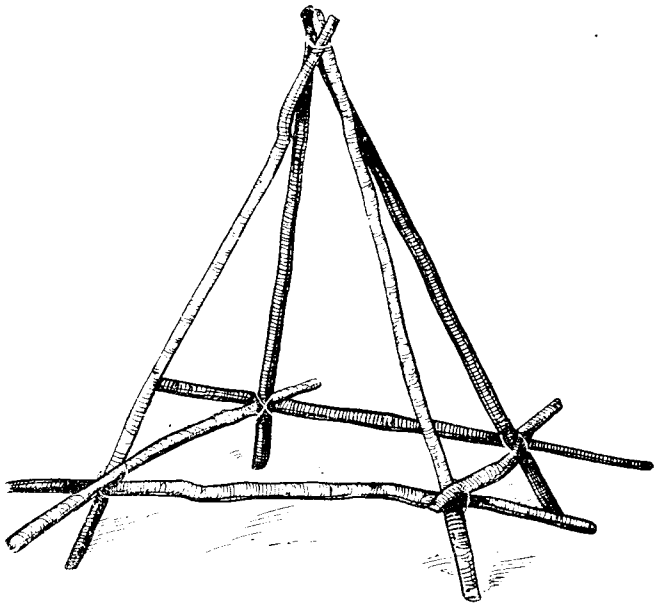


Plate IV. A Pole Frame for Curing Soya Beans.

From the results secured at all three stations, however, and particularly at Winkle Spruit, it would appear that the soya bean is particularly susceptible to injury from both nitrogenous and alkaline salts, and in certain soils also from acid phosphates, during germination and early development. For this reason alone an approved system would provide for the application of fertilizers to some other crop in the rotation.

The following table reflects the result of a similar experiment at the Weenen Station, carried out with seed received from Sutton's of England, which elsewhere gave unsatisfactory results:—

PLANTED 14TH NOVEMBER, 1910. Manures, in lb. per acre.	HARVESTED 27TH FEBRUARY, 1911. Weight of Crop per acre. Lb.
Section 1.—Bone dust 200, potash 100	480
„ 2.—Super. 200, potash 100	710
„ 3.—Slag 200, potash 100	760
„ 4.—No manure	690
„ 5.—Bone dust 200	630
„ 6. Super. 200	800
„ 7.—Slag 200	630
„ 8.—Potash 200	400
„ 9. No manure	730
„ 10.—Lime 300...	830
„ 11. Kraal manure (10 tons)	840
„ 12.—Gypsum 300	800

It will be noted that in the Weenen soils response to fertilizers is in the majority of cases very small, if not negligible, and their application could not be justified as a profitable investment. Both at this centre and at Winkle Spruit bone dust has had a most extraordinarily deterrent effect. This will be noted in Plots 1 and 5 of the above table, while corresponding Plot 5 at Winkle Spruit with a dressing of 250 lb. of bone dust did not germinate at all, although the adjacent no-manure plot made satisfactory development. It may be generally stated, therefore, that there has been a failure in the current season's experiments to justify any direct system of manuring to this restorative crop.

TIME OF PLANTING EXPERIMENT.

As already stated, the exigencies of farm work determined date of planting soya beans at Cedara. At Winkle Spruit, however, plots of two varieties were established in October, November, and December respectively, and the following results were obtained:—

	YIELD IN LB. PER ACRE.		
	October.	November.	December.
Chinese White	464	688	508
Natal White	452	1008	572

Such results would apparently clearly indicate November as the best month for planting soya beans on the Natal coast, which corresponds with similar results at Cedara in earlier years. The crop is particularly intolerant of a cold soil, and stands planted in September have often failed to mature before those established in November of the same season.

DISTANCE OF PLANTING EXPERIMENT.

The character of weed-growth in Natal precludes any system of planting for soya beans other than that of drilling. Thorough inter-row cultivation is necessary until the crop is well established, when,

in the case of the more vigorous varieties, the plants close in the spaces between the rows, and check subsequent weed development. The spacing between the rows should be adjusted to the habit of the plant, whether dwarf, semi-dwarf, or mammoth type. The soya bean seems very sensitive to crowding, and for such types as the Mammoth Yellow, Guelph, and Chinese White a 3-ft. spacing would not appear to be too much.

At the Weenen Station a distance of planting test was made with the semi-dwarf variety, Sutton's, when a maximum return was obtained from the 2-ft. rows. The actual returns are given in the following table:—

PLANTED 15TH NOVEMBER, 1910.		HARVESTED 28TH FEBRUARY, 1911.
	Distance of Rows.	Yield in lb. per acre.
Section 1	3 feet rows	300
„ 2	2½ „ „	360
„ 3	2 „ „	480
„ 4	1½ „ „	370
„ 5	1 „ „	360
„ 6	6 inch „	100

Variety: Sutton's. Manure: 200 lb. superphosphate and 120 lb. potash per acre.

A similar experiment is reported from the Purdue University Experiment Station. For three years these beans were planted at different distances and given the indicated treatment, with the following average results:—Drills 32 in. apart and cultivated gave a yield of 21.3 bushels; drills 24 in. and cultivated, 20.4 bushels: drills 8 in. and not cultivated, 15.6 bushels; broadcast and uncultivated, 10.7 bushels. The seed required per acre was 24 lb. for the first plot, 32 lb. for the second, and 80 lb. for the last two plots. The saving on the cost of seed, apart from increased yield, is sufficient to cover expenses of cultivation.

(To be continued.)

Acorn Poisoning in the Ostrich.

By Wm. Robertson, M.R.C.V.S., Acting Assistant Director of Veterinary Research, Grahamstown.

During the past two months I have met with three cases where a great and sudden mortality amongst adult ostriches was directly traced to the injudicious eating of ordinary ripe fallen acorns.

I take it that on some farms these as a cause of death are not so rare as we think, but the mortality is often put down to another cause, as most farmers regard acorns (with truth) as a suitable food for ordinary farm stock and even ostriches. As a rule the oak is not often met with in the neighbourhood of ostrich farm homesteads, as the veld best suited for birds is new land, and the three cases I am dealing with all occurred in the vicinity of farms established by the 1820 settlers, who were responsible for the oak-bordered paddocks now laid down in lucerne. The culture of ostrich and ostrich rearing is spreading even into the older settled parts of the Western Province with its host of oak trees, and it is with the view of putting farmers in such surroundings on their guard that I am publishing these few notes. Work with ostrich diseases is a somewhat unsatisfactory matter; disease and death appears suddenly, and if only two or so die the farmer—often great distances away—does not take any action; as a rule it is only when many die, and those of great value, that we are informed of any cases of sickness.

Adult ostriches, with the exception of internal parasites, are singularly free from any disease of the nature of an epidemic, and if we except anthrax or miltziekte, which is very sudden and fatal in this bird, I know of none. Once a bird is over three years his troubles are few (with the exception of those named) and he may live to a long age, and would no doubt do so if his great stupidity did not lead him to take fright at nothing and blunder into rails, fences, or sluits, and kill himself.

History of Mortality.

A very prominent farmer in this district, and a pioneer in the ostrich industry, came into the laboratory and stated that he had been away from home for a week, and on his return noticing a lot of thirty birds running in fine watered lucerne looked sick, he resolved to attend to them in the morning. Next day he found a cock worth £700 missing, seven others dead, and ten very sick; some of them his best young birds. Poison was suspected, and a dose of raw linseed oil (1 pint) given to each. I visited the farm and found the seven dead birds and the sick lot; one of the latter died, shortly after my arrival, in a regular flurry and evidently in great pain, and from the scraped appearance of the ground in their neighbourhood the others had succumbed in a similar manner. I made a post-mortem on this one first. Subject: *Hen bird*, still warm, carcass in very good condition and fat, abdomen somewhat distended and slightly blown up. *Lungs, heart, liver, spleen*, all normal. *Stomach* contained a large amount of

undigested foods, and at the lower end a quantity of whole undigested acorns (birds left acorn paddock on the 21st). The *intestines* showed all the signs of constipation with subsequent congestion. The *duodenum*, or first gut from the stomach, was swollen, thickened, and congested with blood, and the lining membrane showed signs of acute inflammation, and was covered with a dirty greyish white deposit or slime; on scraping this off the lining of the bowel was almost blood coloured. The other intestines (*jejenum* and *ileum*) showed similar lesions, and the twisted gut, called the *colon*, was simply packed with pellets of hard dung; these were so hard that they shot out from between the finger and thumb like a melon seed. These pieces of dung were pitch black in colour and covered with a grey slime and traces of blood; the lining of this gut was also blood red. The end pouch, or *cloacae*, simply packed hard with masses of dung. I made five other post-mortems and the appearances were the same in all cases.

CLINICAL SYMPTOMS.

I examined the sick birds; they showed varying degrees of sickness; seven were the worst; these lay persistently, moved reluctantly when driven, and absolutely refused any kind of food; frequently they ruffled up their feathers and appeared as if about to dung, straining somewhat. Several dunged while I was in the kraal and passed a few nearly cylindrical pellets of the hardest ejecta I ever saw, and all passed a few ounces of urine, exactly like smooth green paint: this urine coloured all the kraal, and on looking at the rest of the bunch, which were not so badly affected, this symptom was noticed in several. Several of the birds appeared to be in pain and twisted their necks in the usual symptom.

TREATMENT.

I at once dosed all the birds with 25 ounces (a wine-bottleful) of raw linseed oil to which I added a level tablespoonful (4 drachms) of powdered barbadoes aloes; I found it best to dissolve the aloes in a little warm water and add to the oil.

Twelve hours after I gave every bird two bottles of warm water, in each of which I dissolved an ounce packet of bicarbonate of soda. The next day the birds were distinctly better; the medicine had operated on all, but the seven were not eating, so gave gruel, raw eggs, and brandy three or four times during the day. On the third day five birds started feeding when driven on to lucerne; one young cock of a very valuable strain and one old hen refused to feed. Gave each two bottles gruel with eggs and brandy four times a day. These two birds stand nearly motionless with closed eyes and seem to have some difficulty in maintaining their balance. On the fourth day I gave the cock and hen not feeding daily doses of 3 drachms of powdered gentian and 1 drachm of bicarbonate of soda in a gelatine capsule, and by hand gruel and cut prickly pear. These two birds started feeding the next day, that is nearly six clear days they were kept alive by hand feeding, and now they are quite recovered, but it has driven both of them and the others clean out of mating for the first part of this season, and they are shadows of their former selves, but picking up rapidly.

The birds must have eaten an enormous quantity of the acorns. The paddocks are all the same size, and in an empty one the ground was thick with the acorns, while where the birds had run *not a single* one was to be seen.

SECOND CASE.

Here the farmer asked for advice, having lost nine valuable birds quite suddenly, and suspected arsenical poisoning, as he had some time before been using an arsenite of soda spray for jointed cactus. The birds were running in a mealie land with natural veld, receiving food in addition, such as prickly pear and cut sheaves of dry barley, and separated from a similar lot of birds receiving similar treatment. There were fifty birds in the lot; ten were dead when I arrived and about ten sick.

Post-mortem.—Subject: A young cock, first after chick. Body still warm and well nourished. Blood still fluid. *Lungs, heart, liver,* all normal. *Spleen* swollen and soft, due to the day being thundery and close. Decomposition was advancing with extreme rapidity. *Stomach* much distended with material, hard and firm to the touch, filled with tightly packed food, grass and cut dry barley, the grains of which had swollen and fermented, causing a sickly sour odour, and about five acorns. Small *intestine* thickened and inflamed, the lining (m. membrane) covered with a croupous exudate and very much inflamed. Other intestine (*caecum*) full of dark tarry material. The twisted gut (*colon*) packed with separated lumps of dung, hard and dry, and covered with mucus; the lining of the gut much inflamed; the *cloacae* packed with hard dry faeces.

I made in all four post-mortems and the salient symptoms were present in all.

SYMPTOMS SHOWN BY SICK BIRDS.

Seen on Thursday, first noticed sick on the Tuesday. Birds lie persistently, seem much constipated, strain, appear giddy, and stagger on tiptoe, balancing themselves with their wings, and pass the green, paint-like urine before alluded to in the first case. I was at once struck by the similarity in the post-mortem between the first case and the second case, but in the latter it was difficult to find a clue; there were no oak trees in the neighbourhood, and only in the first bird's stomach did I find acorns. In all we found the stomach full of fermenting barley, and I was reluctantly compelled to accept that as the cause of death, the owner arguing that it could not be acorn poisoning as such trees did not exist in his neighbourhood. I treated the lot with 4 drachms (a level tablespoonful) of barbadoes aloes dissolved in a little water, and added to a wine-bottle of raw linseed oil, to be followed in twelve hours by a bottle of tepid water, in which had been dissolved a packet (1 ounce) bicarbonate of soda. I saw the birds two days after and they looked much better; all the sick ones with the exception of one had commenced to feed.

THIRD CASE.

The owner informed me that the cause of the trouble *was acorns*, some bags of which had been brought on to the farm for pig food, and the ostriches had obtained access to them through a gap in the fence and finished the lot. I take it that the barley being above the acorns in the bird's stomach hastened death by fermentation and absorption of the poisonous gas evolved. I advised the owner to give the recovering birds a teaspoonful of powdered gentian, a tablespoonful (level) of bicarbonate of soda, and a level teaspoonful of ginger in a pill daily. I saw the birds recently, and even after a period of three weeks one can pick out the birds which were affected from the rest of the troop.

It may be argued that acorns are quite safe as an ostrich food. Personally I find them most excellent in moderation I have given birds a pound daily for three weeks with very beneficial results, but I take it that the birds in both the cases reported obtained sudden access to an unlimited quantity of acorns and gorged themselves. An ostrich seems to have a fascination for picking up and swallowing a small ovoid shiny body like an acorn and appears to go on feeding, quite unconscious of the fact that the gullet as well as the stomach is full.

Acorns contain a large quantity of tannic acid, a most astringent drug, and that is the whole reason for the sickness and mortality amongst the birds. I might say that I find barbadoes aloes and raw linseed oil a specially good purge for the ostrich and one very valuable to have on hand when poisoning is suspected. It is a reliable dose and nearly always does its work, whereas salts and plain oil are very disappointing; and it should be borne in mind that *an aperient given in two small doses never has such an effect as a single good dose*, therefore when you give one give the full amount.

Traumatic Pericarditis of Cattle or Inflammation of the Heart Sac caused by a Foreign Body taken into the Stomach.

By J. R. Hamilton, Government Veterinary Surgeon, Orange Free State.

This complaint is fairly common in South Africa, and as it appears not to be generally known by farmers a few remarks on the subject may be of interest. In several instances I have found people mistake it for contagious lung-sickness and report it as such; and this is not unnatural when we find that some of the symptoms are somewhat similar in both complaints—in the live animal and also in the dead one, though in the latter the mistake ought not to be so common. On opening the chest cavity and seeing yellow fluid, with possibly inflammation and consolidation of a portion of the lung, a hasty conclusion is apt to be made that the case is true lung-sickness, when a more careful examination would reveal the real cause.

Cause of Complaint and Reasons for it.

Cattle are subject to it because they bolt coarse food with little or no preliminary mastication, and therefore do not so readily reject indigestible substances as nails, pieces of wire, etc.; they are also fond of picking up all sorts of things about rubbish heaps. This is especially the case with milking cows, and my experience is that about four-fifths of the cases occur in them—oxen, young stock, and bulls being only rarely affected in South Africa.

When such things as nails, wire, etc., are swallowed they are either immediately retained in the second stomach or are returned to it from the large stomach by its movements in preparing the food, and this second stomach (honey-comb stomach or klein pens), with its cell-like structure, offers every facility for retaining such objects. It is true that nails, buttons, etc., may lie indefinitely in this stomach and do the animal no harm, but when the object is of a fair length, thin, and more or less pointed, it is a different tale. In my limited experience the cause of the complaint has invariably been a piece of wire, about as thick as a knitting needle and 3 or 4 inches in length.

In discussing why such an object almost invariably works forward towards the heart, we must first note the relative positions of the organs. The second stomach lies immediately behind the diaphragm (curtain which separates the abdominal and chest cavities), and the heart with its sac immediately opposite it in front of the diaphragm. Two factors would appear mainly to influence the movements of the object, one being a suction or tractive power exerted by the pulsation of the heart itself and the other pressure from behind by the motions of the coarse food

in the stomach. In one case I found the piece of wire had not only penetrated the heart sac, but had gone right through the thick heart wall to the inside.

An interesting case which I had a few months ago showed on post-mortem the heart and its sac not affected, but immediately adjoining it a mass of inflammatory growth, and in the middle of this a curved piece of wire 3½ inches long. Now I am firmly of opinion that this wire started to penetrate directly for the heart, but, being curved, could not advance in a straight line, and therefore missed it.

SYMPTOMS.

These vary according to the stage of the disease, and are often so obscure that even the most experienced and careful person cannot give a positive opinion as to the nature of the complaint. It would therefore be useless, and possibly misleading, to go into them very minutely.

In the early stage the symptoms are often those of ordinary indigestion, such as intermittent suspension of cudding, listlessness, disinclination for active movement, and may be occasional tympanitis (blowing up of the stomach). As the disease advances there is more marked disinclination for movement, and the animal probably stands for a considerable time with the back slightly arched and an anxious expression on the face; when going to lie down it does so with great care, and seldom lies long at a time. If a person approaches it roughly, or taps it with the fist on the side, it may give a groan or grunt of pain.

When trying to eat or drink it may give a partly suppressed painful cough, but softer than the cough of contagious lung-sickness. In an advanced and typical case even a non-expert can detect the abnormal heart-sounds by placing his ear to the left side behind the elbow, the heart beats being accelerated up to 100 or more per minute, and often gives a clear, sharp ring quite unlike the deep thud of a healthy heart. In other cases the heart sounds are very muffled and appear far off, and sometimes there is a sound as of the heart working in liquid.

The duration of the complaint from the time the foreign body begins to pierce the stomach wall till death varies very much, and I think may be put down as any time from a week to a couple of months. I am, however, open to correction on this point. If there is much septic matter carried by the wire into the chest cavity death is quicker than if there is little. But in some rare cases death may occur very quickly from shock. I had an instance of this lately, when a bull suddenly dropped dead after a few days' slight illness. In this case I found a piece of tough reed had penetrated to the chest from the stomach and, I presume, implicated some vital nerve, and so caused death.

TREATMENT.

It will be evident to every one that treatment in such a complaint is useless. Experts have operated in some cases, but as a rule the operation is a failure, chiefly on account of the difficulty of positively diagnosing the malady at a sufficiently early stage. The difficulties of guarding against its occurrence are also very great, as pieces of wire, such as I have described, are scattered almost everywhere.

POST-MORTEM APPEARANCES.

On opening the chest cavity the heart sac is usually found to be enlarged by thickening of its wall and covered with a yellow exudate. This exudate may also be over the lungs and chest wall and some of it floating loose in the chest. A portion of one or both lungs is often found to be consolidated and showing evidence of septic inflammation. These general appearances, as I have before mentioned, sometimes lead a casual observer to believe that the case is one of contagious lung-sickness. In several instances I have known natives opening an animal so affected to exclaim at once, "Oh, baas, lung-sickness". But the mistake need not be made by any one who knows true lung-sickness, because, independently of finding the cause, the typical marbling appearance of the lung in contagious lung-sickness is absent in this complaint.

In looking for the piece of wire or other foreign body it is best to remove the whole of the internal organ in one mass carefully and then search in the region of the heart sac and second stomach before they are much tossed about, as otherwise the wire may drop out and lie on the ground unobserved.

Milk Record.

ELSENBURG COLLEGE HERD.

Breed and Name of Cow.	Days in Milk.	Yield in Lb.		
		During June.	Total to Date.	Daily Average.
FRIESLANDS.				
Rose	287	485	7814	27·2
Bell	216	437	5247	24·2
Veronica	193	419	3857	20·0
Boerin	149	67	2010	13·4
Cato	125	246	1240	9·9
Victoria	97	737	2782	28·6
Anna	83	286	1021	12·3
Christina 58	83	437	1498	18·0
Daisy	45	703	1262	28·0
Violet	34	1085	1242	36·5
Beauty	32	1115	1182	36·9
Vera	32	1112	1183	36·9
JERSEYS.				
Evelyn	286	60	3361	11·7
Glee	279	142	5132	18·3
Gwendolen	76	477	1440	18·9
Gertie	76	661	1867	24·5
Grace	59	529	1208	20·4
Gus...	51	496	854	16·7
Gladys	50	608	1073	21·4
Gilliflower...	30	575	575	19·1
Fanny	16	330	330	20·6
AYRSHIRE.				
Lobelia	61	655	1539	25·2

Average percentage of butter fat ... { Frieslands ... = 3·18 per cent.
Jerseys ... = 5·12 „
Ayrshire ... = 3·6 „

Millets.

By J. A. T. Walters, B.A., Assistant Botanist (Transvaal).

Introductory.

There are at the present time about twenty-four leading varieties of millets on the European and American markets. With no class of seeds has so little been effected in the way of classifying the varieties and assigning a fixed name to each. Many varieties are grown in different parts of the world under one name, and the same variety not infrequently passes under different names in other localities. Constant complaints are made by seedsmen and growers that millet seeds are not true to name. One of the reasons for this confusion is the difficulty in determining the variety from the seed. The seed is almost identical in a group of millet varieties such as Boer Manna, Golden Millet, German Millet, all of which are derived from one common parent—the grass known as *Setaria italica*.

The seed of Japanese barnyard millet differs considerably from the others, the plant being derived from another parent—the grass called *Panicum Crus-galli*. These seeds are greyish in colour, flat on one side, round on the other, and the husk is persistent and angular, covering the seed loosely.

In the broomcorn millets (*Panicum miliaceum*) the seeds are large and rounded, and either pearly white or reddish in colour.

The seeds of pearl millet are distinctly bluish in tinge and larger than any of the others, pear shaped, i.e. rounded at one end and pointed at the other.

Classification.

Many attempts have been made to classify the various varieties of millets under cultivation, the most thorough of which was that of Dr. Körnicke in 1885, who based his classification on the following characteristics:—

1. Size of heads.
2. Size and colour of beards.
3. Colour of seeds.

On this basis he divided the cultivated millets into sixteen varieties and assigned a botanical name to each. This was twenty-six years ago. Since that time many new varieties have been produced through selection by growers, or have been imported from other countries, and it is now usual to group millets into three large classes, as follows:—

1.—*Foxtail Millets*, or "Mannas", having a compact cylindrical, nodding head, in some cases slightly tapering at one or both ends, from 3 to 8 inches long (Plates 1, 3, 4, 5, and 6). These are again sub-divided as follows:—

(*a*) Large-headed varieties: Boer Manna, German Millet, Golden Millet, Golden Wonder Millet, Japanese Foxtail Millet, Italian Millet, and Red Siberian Millet.

The millets of this group stand from 2½ ft. to 4 ft. high, and have heads from 6 to 8 inches long (Plates 1, 3, and 4).

(*b*) Small-headed varieties: Common Millet, Hungarian Millet, Californian Green Moha, Early Caucasian. These are shorter than the above varieties, and the heads rarely exceed 4 inches in length (Plates 5 and 6).

II.—*Barnyard Millets*: Japanese Barnyard Millet, Ankee Millet, and Shama Millet. The first is the only one cultivated in South Africa (Figure 7).

III.—*Broomcorn Millets*: Here the seed is a loose panicle (Figure 2). There are a great number of varieties in this group, many of which are identical, going under slightly different names: French White, Improved White French, White Pearl, Brown Millet, Early Fortune, Manitoba, Californian Beauty, Turkish Millet, Chinese White, and Japanese White.

IV.—*Pearl Millet* (*Pennisetum spicatum*) (Figure 8).

The above classification has the additional advantage of separating the millets according to their origin. A short description of the principal varieties grown in the Transvaal is given below. The notes are from observations taken on the plants growing at the Experiment Station, Skinners Court, Pretoria.

I.—Foxtail Millets, or Mannas.

German Millet (Plate 1).—Plants 3½ to 4 ft. high. Leaves numerous and broad, having a bright golden tinge when mature, particularly near the base. Heads 4 to 5 in. long, redder in tinge and with longer beards than Boer Manna; compact, hardly showing the sub-divisions. Seeds small and yellow in colour. Stems usually single from the root and rather thick. Maturing about a month earlier than Boer Manna.

Boer Manna (Plate 3).—Plants 4½ to 5 ft. high. Later and more prolific than the other heavy-yielding varieties which it otherwise resembles. Heads up to 7 in. long, narrower, and more open than in Golden or German Millets, and also less bearded. Do not taper at the point or base. Seeds small, yellowish. Stems thinner than Golden or German Millet.

Red Siberian.—Plants up to 4 ft. high, well covered with long leaves, the whole having a dark red appearance at maturity. Heads up to 6 in., resembling Boer Manna heads, but redder and looser; beards long. Leaves 1 in. across. As many as twelve leaves on some plants.

Golden Millet (Plate 4).—Plants about 3½ to 4 ft. high. Resembling German Millet and equally early, but with shorter, thicker, and more compact heads. Leaves and stems become golden yellow in colour as the plant ripens. Heads up to 5 in. long. Straw and stem finer than in German Millet. Seeds small, roundish, yellow.

A variety called *Kaalkop* is grown by some farmers in the Transvaal. This variety is almost beardless and has a purplish tint. The heads are as long as those of Boer Manna, and one farmer admits that he obtained his variety by selection in the field.

Italian Millet.—This is not so well known as the other varieties. It strongly resembles German Millet, but the heads are thinner and run to about 7 inches long.

Golden Wonder.—This variety is reputed to be the heaviest seed yielder of the Foxtail group of millets. Heads generally longer and looser than those of the other varieties.

New American Varieties,—Several of these have been tried at the Experiment Station, Skinners Court, and one marked 22425 proved to be a splendid yielder of forage. The heads were characterized by unusually long beards.

Small-headed Varieties (Plates 5 and 6).—In these varieties the heads are rarely more than half the size of the above varieties. The plants also rarely exceed 3 feet in height, the yield of forage falling very far short of that obtained from German Millet or Boer Manna. The straw and leaves are, however, much finer than in the other varieties, and these millets are grown extensively in America for that reason, being much preferred as forage to the coarser and bigger varieties.

Among the chief varieties of the above class grown in South Africa are:—

Hungarian Millet.
California Green Moha.
Early Caucasian.
Common Millet.

The seeds of these varieties in general are large and yellowish, and in the case of Hungarian Millet a high percentage of black seeds may be found, or they may be entirely black. Although there are still differences between the varieties, a description of Hungarian Millet and California Green Moha will give a fair idea of all the millets of this class. A variety resembling these is grown in this country under the name of Red Millet on account of the purplish colour of the beards and the seed husks. It is found, like the above varieties, to do better on poor soils and to be more drought resistant than the heavier varieties.

Hungarian Millet.—Grass-like plant, 2 to 3 ft. high. Decidedly inferior in yield of forage to Boer Manna or German Millet, but better adapted to poor soils and dry conditions than the heavier-yielding varieties. Heads 2 to 4 in. long, thin, and bearded. Compact towards the apex, but loose at the base, which gives them an irregular appearance. Seed bigger than Boer Manna or German Millet, and partly or entirely black in colour, pointed at one end. Several stems from the same root.

California Green Moha is considered by French writers to be only an improved variety of Hungarian Millet, retaining the green colour of head even when ripe and being more leafy. It is also considered to be earlier, but requires a richer soil.

Early Caucasian (Plate 6).—Plants 18 in. high. Heads 2-3 in. long. Leaves narrow and long, but very plentiful. An early variety, but inferior in yield of forage.

Common Millet.—There would seem to be two varieties grown under this name, both belonging to the Foxtail group of millets, one having a shorter head than the other and standing about a foot lower. The variety generally known as Common Millet is the shorter one, with the smaller head (Plate 5).

II.—Barnyard Millets (Plate 6).

These differ distinctly from the Foxtail varieties, in that the seed-head has each division well separated and from 1 to 2 in. long, giving it an open appearance as contrasted with the well-packed appearance of the Foxtail millets. The head is of a dark grey colour, the seed husks

being angular, and the seed itself of a light drab colour. The principal variety grown is the Japanese.

In comparatively dry districts the Barnyard Millets do not offer any advantage over the Foxtail Millets in point of yield, and are also reputed to be poor drought resisters. But excellent results have been obtained with them on the eastern high veld of the Transvaal. Provided the season is favourable they yield a heavy crop, and are ready for cutting for forage in two and a half months from the time of sowing; and if sown early there seems to be no reason why a second cutting should not be obtained the same season. Japanese Barnyard forage is considered by Americans to be superior to that of any of the other varieties.

III.—BROOMCORN MILLETS (PLATE 2).

These are essentially bird-seed millets, producing in every case large white, yellow, or red seeds about twice the size of the seeds of the Foxtail group. The plants are generally low-growing, rarely exceeding 2 ft., except in the case of the improved varieties, and the heads form open nodding panicles somewhat like broomcorn heads. The French varieties produce seed of a pearly white colour, and almost as large as Pearl Millet seed, and are known under such names as French White, White French, and Improved French. Early Fortune has a reddish seed, and Brown Millet seeds are still a darker red. Plates 9 and 10 show the relative size of seeds. We have no Transvaal returns as to the weight of seed obtained from these Broomcorn varieties, but the American returns give as high as 50 bushels, or 2500 lb., per acre.

The value of the Broomcorn Millets lies almost entirely in the seed produced, which is used for feeding cage birds: the leaves tend to disappear in most cases when the plant arrives at maturity. These millets are largely grown in Russia, where they are called "Proso" millets, a name adopted by some American writers in describing them.

White French, French White, and Improved White French.—Probably the same variety under different names, standing about 2 ft. high, all having white seeds distinctly larger than those of the other varieties.

White Millet.—The tallest of the Broomcorn Millets, with a thicker stem and longer panicle than the others. Plants up to 3 ft. 6 in. high.

Early Fortune.—From 18 in. to 2 ft. 6 in. high. Heads up to 4½ in. long in a compact panicle. Seeds of a reddish brown colour.

Red Orenburg, Black Voronezh.—Russian varieties, standing up to 2 ft. 6 in., the latter having seeds almost black in colour.

Brown Millet.—One of the smallest varieties, characterized by brown seeds.

IV.—PEARL MILLET.

This variety is quite distinct from the others, growing from 6 to 15 ft. high and having a compact cylindrical upright head up to 10 in. long. This variety gives an enormous amount of forage, but of a coarse and inferior quality. Its chief value lies in the seeds, which are of a large size and are produced abundantly, and are much used as food for poultry and by the natives for making beer. Plate 8 shows some of the different types to be obtained of this variety in the

country. The improved strain sold by seedsmen has a head similar to the smaller one of the three, but is twice as long.

Under the name of Italian Millet a variety was tried at Skinners Court which resembled Pearl Millet, but the heads, instead of being long and cylindrical, were round and almost ball-shaped.

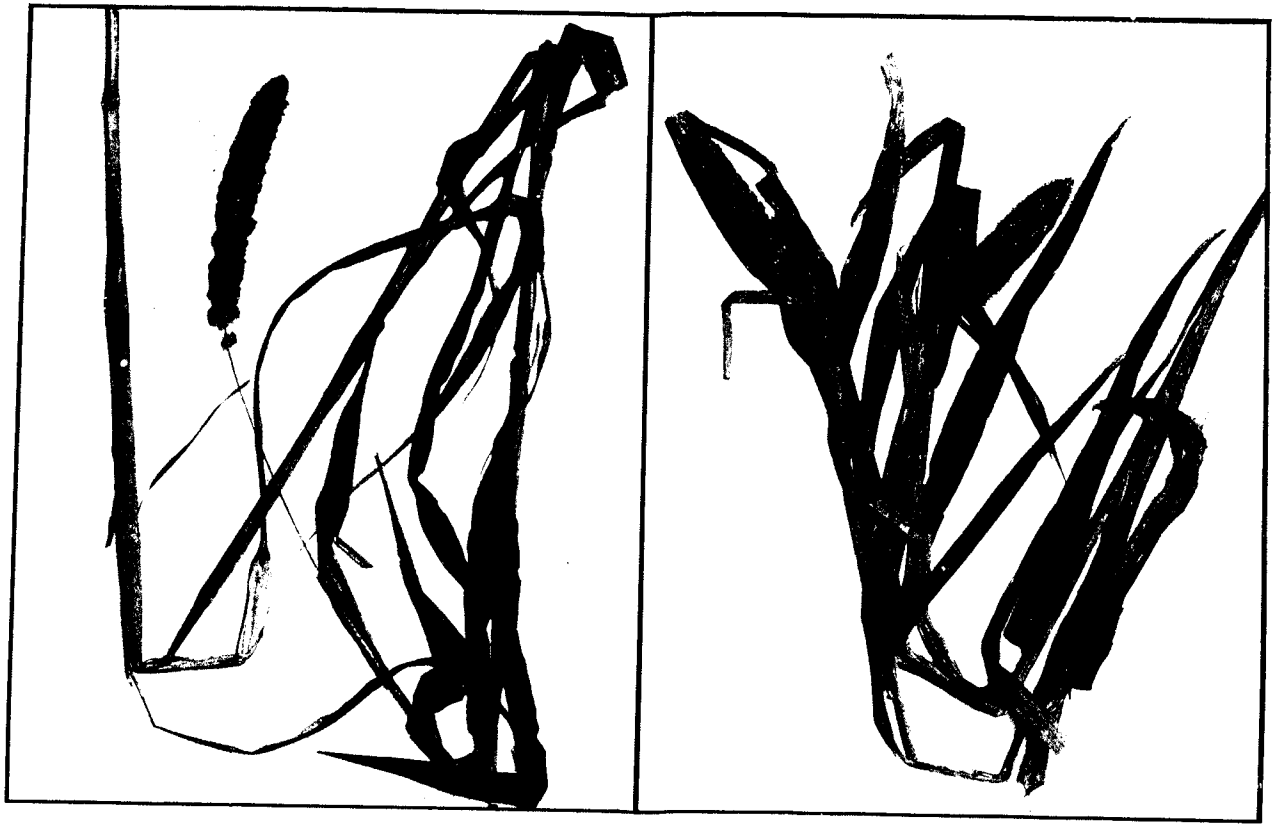
LIST OF PLATES.

1. German Millet.
2. Broomcorn Millet: White Pearl.
3. Boer Manna.
4. Golden Millet.
5. Common Millet.
6. Early Caucasian.
7. Japanese Barnyard Millet.
8. Pearl Millet.
9. Millet Seeds: Comparative size.
10.

German Millets (Fig. 1).

Broom Corn Millet (Fig. 2).

Millets.



Boer Manna (Fig. 3).

Golden Millet (Fig. 4).

Boer Manna (Fig. 3).

Golden Millet (Fig. 4).

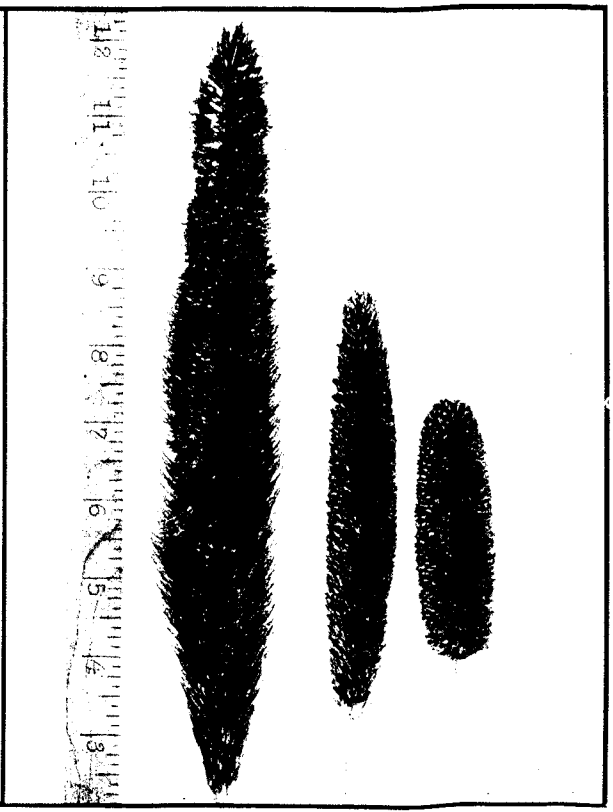
Millets.

Common Millet (Fig. 5).

Very Early Caucasian (Fig. 6).

Millets.

Japanese Millet (Fig. 7).

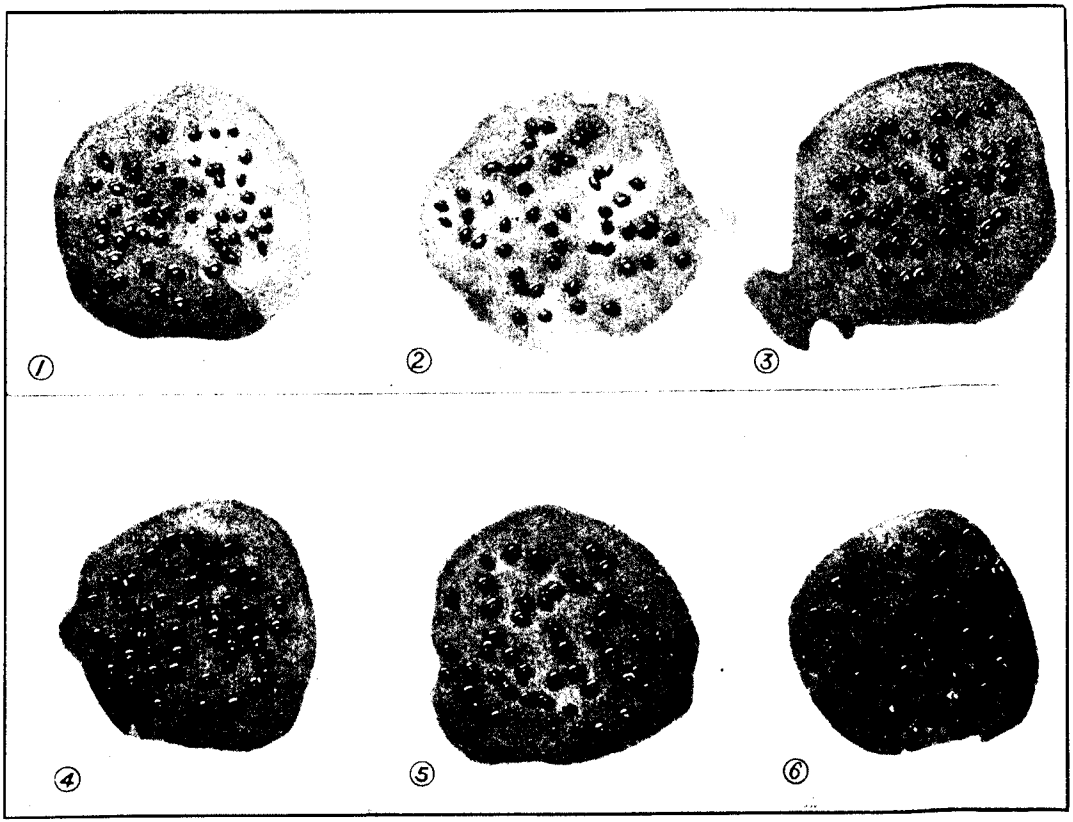


Pearl Millet (Fig. 8).

Japanese Millet (Fig. 7).

Pearl Millet (Fig. 8).

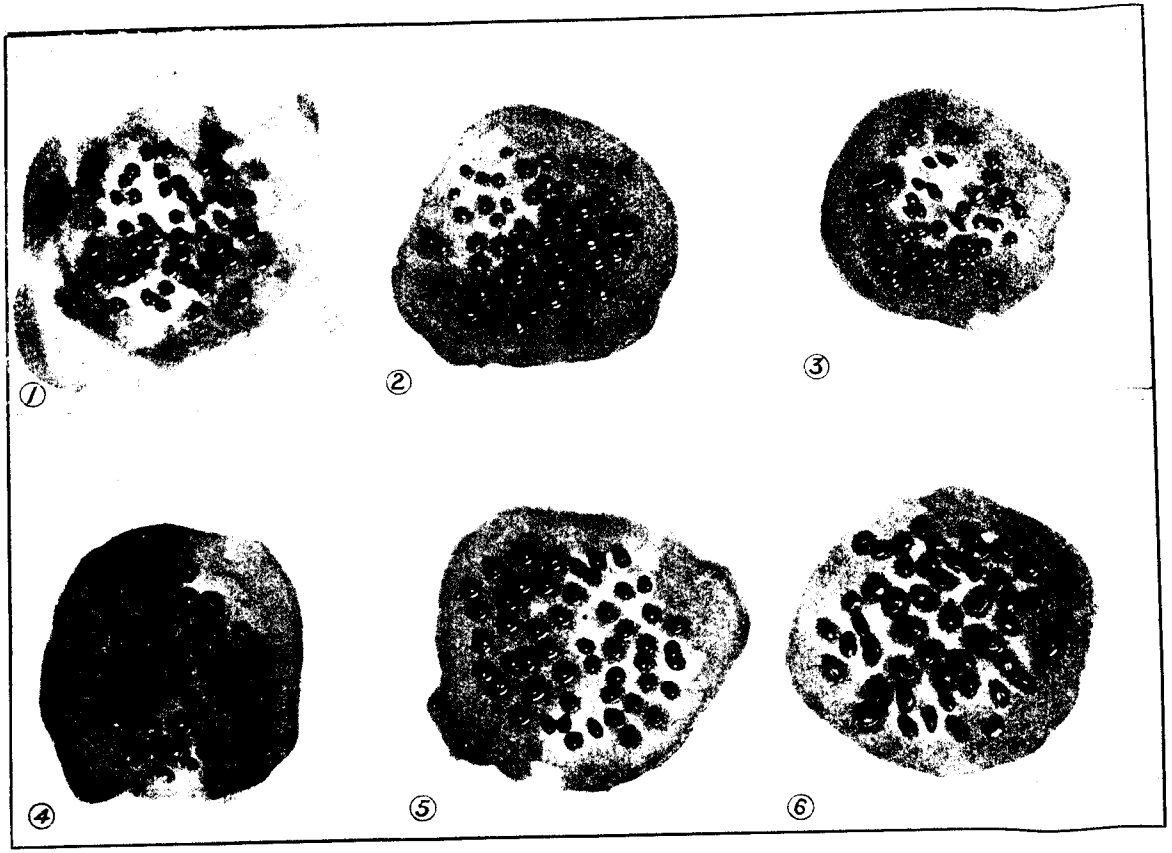
Millets.



COMPARATIVE DIAGRAM (Fig. 10).

1. Beer Manna.
2. German Millet.
3. Golden.
4. Red Siberian.
5. Hungarian.
6. Japanese Barnyard.

Millets.



COMPARATIVE DIAGRAM (Fig. 9).

1. Indian. 2. Common. 3. Californian. 4. White French. 5. Early Fortune. 6. Pearl Millet.

Outbreaks of Animal Diseases.

RETURNS FOR THE MONTH OF JUNE, 1911.

THE following returns show the outbreaks of contagious and infectious diseases of animals up to the end of June, 1911, in the several Provinces of the South African Union:—

I.—CAPE PROVINCE.

Summary of Outbreaks of Scheduled Contagious and Infectious Animal Diseases reported during the month ended 30th June, 1911.

DISTRICT.	East Coast Fever.	Anthrax.	Glanders.	Lung-sickness.	Spons-ziekte.	TOTAL.
Alexandria	.	1	.	.	2	3
Barkly East	.	.	.	.	1	1
East London	.	.	.	1	1	2
Glen Grey	.	.	.	.	2	2
Herschel	.	2	.	.	2	4
Kingwilliamstown	.	1	.	.	5	6
Komgha	.	.	.	1	.	1
Kuruman	.	1	.	.	.	1
Queenstown	.	.	.	.	1	1
Riversdale	.	.	1	.	.	1
NATIVE TERRITORIES.						
Tembuland.						
Umtata	2	.	.	.	.	2
Engcobo	1	.	.	3	.	4
St. Mark's	.	.	.	1	.	1
Mqanduli	5	.	.	.	.	5
Transkei.						
Ngamakwe	.	.	.	.	3	3
Willowvale	1	.	.	1	.	2
Pondoland.						
Libode	.	.	.	1	.	1
Bizana	2	.	.	.	.	2
Flagstaff	.	.	.	.	1	1
East Griqualand.						
Umzimkulu	6	.	.	.	.	6
Tsolo	.	.	.	1	.	1
Mount Fletcher	.	.	.	.	4	4
TOTALS	17	5	1	9	22	54

II.—NATAL.

Summary of Fresh Outbreaks of Contagious Diseases reported during the month ended 30th June, 1911.

DISTRICT.	Rinderpest.	Pleuro-Pneumonia.	East Coast Fever.	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Ulcerated Lymphangitis.	Sheep-pox.	TOTAL NUMBER OF OUTBREAKS.
Newcastle	.	.	.	.	.	.	.	6	.	.	2	.	.	8
Dundee and Umsinga	.	.	.	.	.	.	.	5	.	.	.	.	.	5
Klip River	.	.	.	.	.	.	.	2	.	.	.	.	.	2
Camperdown	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bergville	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Estcourt	.	.	2	.	.	.	.	16	.	.	.	.	.	18
Weenen	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Krantzkop	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Umvoti	.	.	.	.	.	.	.	1	.	.	.	1	.	2
New Hanover	.	.	.	.	.	.	.	1	.	.	.	.	.	1
Mapumulo	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lower Tugela	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Inanda	.	.	.	.	.	.	.	.	.	.	.	3	.	3
Indwedwe	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lion's River	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pietermaritzburg and Umgeni	.	.	.	.	.	.	.	5	.	.	.	.	.	5
Impendhle	.	.	1	.	.	.	.	.	.	.	.	.	.	1
Ipolela	.	.	3	.	.	.	.	.	.	.	.	.	.	3
Underberg	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Richmond	.	.	.	.	.	1	.	.	.	.	.	.	.	1
Ixopo	.	.	5	.	.	.	.	3	.	.	.	.	.	8
Alfred	.	.	5	.	.	.	.	3	.	.	.	.	.	8
Lower Umzimkulu	.	.	.	.	.	.	.	.	.	.	.	1	.	1
Alexandra	.	.	2	.	.	.	.	.	.	.	.	.	.	2
Durban and Umlazi	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vryheid, Ngotshe, and Babanango	.	.	.	.	.	.	.	33	.	.	.	.	.	33
Utrecht	.	.	1	.	.	.	.	1	.	.	.	.	.	2
Paulpietersburg	.	.	.	.	.	.	.	11	.	.	.	.	.	11
Zululand	.	.	.	.	.	.	.	11	.	.	.	.	.	11
TOTALS	.	.	19	.	.	1	.	98	.	.	2	5	.	125

II.—NATAL—(*continued*).

Return of Cases of Contagious Diseases existing on 30th June, 1911.

DISTRICT.	Rinderpest.	Pleuro-Pneumonia.	East Coast Fever.	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Ulcerated Lymphangitis.	Sheep-pox.	TOTAL NUMBER OF OUTBREAKS.
Newcastle	.	.	20	.	.	.	.	13	.	.	5	.	.	38
Dundee and Umsinga	.	.	133	.	.	.	.	6	.	.	327	.	.	466
Klip River	.	.	114	.	.	.	.	13	.	.	8	.	.	135
Camperdown	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Bergville	.	.	23	.	.	.	.	2	.	.	7	.	.	32
Estcourt	.	.	93	.	.	.	.	23	.	.	.	.	.	116
Weenen	.	.	43	.	.	.	.	1	.	.	5	.	.	49
Krantzkop	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Umvoti	.	.	138	.	.	.	.	17	.	.	21	1	.	177
New Hanover	.	.	*	.	.	.	.	1	.	.	.	2	.	3
Mapumulo	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Lower Tugela	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Inanda	.	.	*	.	.	.	.	.	.	.	.	58	.	58
Indwedwe	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Lion's River	.	.	77	.	.	.	.	4	.	.	.	.	.	81
Pietermaritzburg	.	.	†	.	.	.	.	7	.	.	.	.	.	7
Umgeni	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Impendhle	.	.	30	.	.	.	.	.	.	.	.	.	.	30
Ixopo	.	.	22	.	.	.	.	.	.	.	.	.	.	22
Underberg	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Richmond	.	.	64	.	.	.	.	.	.	.	.	1	.	65
Ixopo	.	.	141	.	.	.	.	8	.	.	3	.	.	152
Alfred	.	.	21	.	.	.	.	5	.	.	.	3	.	29
Lower Umzimkulu	.	.	*	.	.	.	.	.	.	.	.	3	.	3
Alexandra	.	.	61	.	.	.	.	.	.	.	.	.	.	61
Durban	.	.	†	.	.	.	.	.	.	.	.	13	.	13
Umlazi	.	.	*	.	.	.	.	.	.	.	.	.	.	.
Vryheid, Ngotshe, and Babanango	.	.	*	.	.	.	.	45	.	.	4	.	.	49
Utrecht	.	.	31	.	.	.	.	3	.	.	22	.	.	56
Paulpietersburg	.	.	*	.	.	.	.	11	.	.	.	.	.	11
Zululand	.	.	*	.	.	.	.	35	.	.	3	2	.	40
TOTALS	.	.	1010	.	.	.	.	194	.	.	405	83	.	1692

* Whole district looked upon as infected.
† Practically clean.

III.—TRANSVAAL.

Summary of Fresh Outbreaks of Contagious Diseases during month of June, 1911.

DISTRICT.	Rinderpest.	Pleuro-Pneumonia.	Rhodesian Redwater.	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Ulcerated Lymphangitis.	Sheep-pox.	TOTAL NUMBER OF OUTBREAKS.
Barberton	.	.	.	.	.	.	.	4	.	.	.	.	.	4
Bethal	.	.	.	.	.	.	.	5	.	.	.	.	.	5
Bloemhof	.	.	.	.	.	.	.	30	.	.	.	.	.	30
Carolina	.	.	.	.	.	.	.	4	.	.	.	.	.	4
Ermelo	.	.	.	.	.	.	.	17	.	.	.	.	.	17
Heidelberg	.	.	.	.	.	.	.	9	.	.	.	.	.	9
Krugersdorp	.	.	.	.	.	.	.	4	.	.	.	.	.	4
Lichtenburg	.	.	.	.	.	.	.	16	.	.	.	.	.	16
Lydenburg	.	.	.	.	.	.	.	8	.	.	.	.	.	8
Marico	.	.	.	.	.	1	.	7	.	.	.	.	.	8
Middelburg	.	.	1	.	.	.	.	5	.	.	.	.	.	6
Piet Retief	.	.	1	.	.	.	.	4	.	.	.	.	.	5
Potchefstroom	.	.	.	.	.	.	.	35	.	.	.	.	.	35
Pretoria	.	.	.	2	.	.	.	2	.	.	.	2	.	6
Rustenburg	.	.	.	.	.	.	.	9	.	.	.	.	.	9
Standerton	.	.	.	.	.	1	.	23	.	.	.	.	.	24
Wakkerstroom	.	.	.	.	.	.	.	8	.	.	.	.	.	8
Waterberg	.	.	.	.	.	.	.	2	.	.	.	.	.	2
Wolmaransstad	.	.	.	.	.	.	.	33	.	.	.	.	.	33
Witwatersrand	.	.	.	3	.	1	.	.	.	.	.	.	.	4
Zoutpansberg	.	.	5	.	.	.	.	5	.	.	.	.	.	10
TOTALS	.	.	7	5	.	3	.	230	.	.	.	2	.	247

III.—TRANSVAAL (*continued*).

Summary of Outbreaks of Contagious Diseases existing on 30th June, 1911.

DISTRICT.	Rinderpest.	Pluro-Pneumonia.	Rhodesian Redwater.	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Scab.	Swine Fever.	Swine Erysipelas.	Mange.	Ulcerated Lymphangitis.	Sheep-pox.	TOTAL NUMBER OF OUTBREAKS.	TOTAL NUMBER OF OUTBREAKS.
Barberton	.	.	31	.	.	.	.	53	.	.	.	.	.	84	4
Bethal	.	.	.	.	.	.	.	17	.	.	.	.	.	17	5
Bloemhof	.	.	.	.	.	.	.	142	.	.	.	.	.	142	30
Carolina	.	.	23	.	.	.	.	66	.	.	.	.	.	89	4
Ermelo	.	.	.	.	.	.	.	188	.	.	.	.	.	188	17
Heidelberg	.	.	.	.	.	.	.	120	.	.	.	.	.	120	9
Krugersdorp	.	3	.	.	.	.	.	3	.	.	.	.	.	6	4
Lichtenburg	.	.	.	.	.	.	.	136	.	.	.	.	.	136	16
Lydenburg	.	.	29	.	.	.	.	173	.	.	.	.	.	202	8
Marico	.	.	4	.	.	.	.	17	.	.	.	.	.	21	8
Middelburg	.	.	16	.	.	.	.	113	.	.	.	.	.	129	6
Piet Retief	.	.	36	.	.	.	.	154	.	.	.	.	.	190	5
Potchefstroom	.	.	.	.	.	.	.	147	.	.	.	.	.	147	35
Pretoria	.	.	1	.	.	.	.	102	.	.	.	.	.	103	6
Rustenburg	.	.	8	.	.	.	.	117	.	.	.	.	.	125	9
Standerton	.	.	.	.	.	.	.	81	.	.	.	.	.	81	24
Wakkerstroom	.	.	.	.	.	.	.	170	.	.	.	.	.	170	8
Waterberg	.	.	28	.	.	.	.	24	.	.	.	.	.	52	2
Wolmaransstad	.	.	.	.	.	.	.	161	.	.	.	.	.	161	33
Witwatersrand	.	.	.	.	.	.	.	37	.	.	.	.	.	37	4
Zoutpansberg	.	.	65	.	.	.	.	112	.	.	.	.	.	177	10
TOTALS	.	3	241	.	.	.	.	2133	.	.	.	.	.	2377	47

IV.—ORANGE FREE STATE.

Fresh Outbreaks of Contagious Diseases during month of June, 1911.

DISTRICT.	Rinderpest.	Pleuro-Pneumonia.	African Coast Fever.	Redwater (Ordinary).	Tuberculosis.	Foot and Mouth Disease.	Anthrax.	Glanders.	Mange.	Ulcerated Lymphangitis.	Swine Fever.	Swine Erysipelas.	Sheep-pox.	Scab.	TOTAL NUMBER OF OUTBREAKS.
Bethlehem														14	14
Bethulie														.	.
Bloemfontein and Brandfort														17	17
Boshof														22	22
Edenburg														10	10
Fauresmith														35	35
Ficksburg														18	18
Frankfort								1						13	14
Harrismith														26	26
Heilbron														6	6
Hoopstad														16	16
Jacobsdal														22	22
Kroonstad														22	22
Ladybrand														6	6
Lindley														3	3
Philippolis														14	14
Rouxville														26	26
Senekal														10	10
Smithfield														16	16
Thaba 'Nchu														23	23
Vrede								1						3	4
Vredefort														7	7
Wepener														8	8
Winburg														9	9
Trompsburg														5	5
TOTALS								2						351	353

The Manuring of Vineyards.

Lectures delivered at the Paarl on the 16*th and* 31*st May*, 1911, *by Dr. A. I. Perold, Government Viticulturist (Cape).*

PART II.

The Different Kinds of Fertilizers.

I will now try to give you the necessary information concerning the different kinds of fertilizers, and I will specially dwell on those fertilizers which are of special value for us. These fertilizers can be divided into—

I. Organic Fertilizers	A.—Kraal and Stable Manure (fresh). B.—Karoo Sheep Manure. C.—Guano. D.—Dried Blood. E.—Green Manure.
II. Chemical or Inorganic Fertilizers	A.—Sulphate of Ammonia. B.—Nitrate of Soda. C.—Nitrate of Lime. D.—Lime Nitrogen. E.—Potash Salts. F.—Phosphates. G.—Lime.

I.—Organic Fertilizers.

A.—*Kraal and Stable Manure (Fresh).*

These are the longest known of all fertilizers, and we can at once state that they are the only complete fertilizers. Therefore every farmer will understand that it is of the greatest importance for him to produce as much manure on his farm as possible. In some places this is done in a rational manner, although very often much is lost through bad or wrong treatment. M. Grandeau has calculated that in France an amount of 600 million francs (£24,000,000) is yearly lost in this way. How much is lost in this way in our country has never been estimated yet. However, I am convinced that nobody has an idea how much this yearly loss amounts to here.

We commit the great mistake of building our kraals and stables in such a manner as to allow the liquid manure to escape and be lost. The liquid, however, is the best part of the manure. It would be well to catch the liquid manure in a cement tank and to pour it from time to time on the manure, which should be kept in heaps under cover.

Perhaps it would be easier and more effective to build the kraal in such a way that the longest wall is placed across the direction of the prevailing rains. In the south-west of the Cape Province, where the rains occur principally during winter—being brought by the

north-westerly winds—the longest wall should be built to run from a north-easterly to a south-westerly direction. A hanging roof should then be made which should be as long as this back wall; and in order to prevent the water falling from this roof into the kraal it should rest on the back wall, and be supported in the kraal by pillars which should be higher than the back wall. The floor of the kraal should have a fall from 1 to 50, i.e. 1 foot fall for a kraal 50 feet large, and should be made *waterproof*. This could be done by using round river-bed stones (or something similar) for building the floor, and filling the openings between the stones with a little cement and sand mixed together. The back wall of the kraal should also be waterproof, and should therefore be plastered with cement to a height of about 2 feet. If the kraal is built in this way no liquid manure can escape. The lower parts will be rather moist, but this can do no harm.

The Storage of Manure—

The words of Boussingault are still true, where he says the zeal and intelligence of a farmer can always be judged by the manner in which he treats his manure. In order to show how much manure is lost if it is exposed to the air, Müntz and Girard left a heap of sheep manure outside in the open air and weighed and analysed it from time to time. The results they obtained are given in the table below. Although the weights are given in kilogrammes (1 kilogramme = 2.2 lb.) I did not change them, as we are only interested in the relative and not in the absolute weights.

	Fresh Manure.	Same Manure after 6 months.	Loss.
Weight when wet	7160.3 kgr.	4210.0 kgr.	
Weight when dry	2341.0 „	1755.0 „	586.0 kgr. 25 per cent.
Total Nitrogen	43.7 „	38.7 „	5.0 „ 11 „
Phosphoric Acid	44.4 „	45.9 „	0.0 „ 0 „
Potash	122.4 „	96.0 „	26.4 „ 21½ „

Thus we find here a great loss of nitrogen and potash, whilst the phosphoric acid remained the same.

The nitrogen partly evaporated into the air as ammonia. It is also found in the drainage water, where all the lost potash can also be found.

As shown by the experiments of Deherain the loss of nitrogen by evaporation into the air can be prevented by continually putting fresh manure on top of the old, and by moistening the heap (under roof) often with the drainage water.

The following practical conclusions can be made from the numerous experiments of Deherain:—

1. Make the manure heap (under roof) in a spot where the soil is waterproof and slanting in order that the fluid may be able to run off into a cement hole, into which the drainage water from the stables and kraals can also be conducted.

2. Take enough suitable straw (or "bedding" or "bog" as we call it here).

3. Every morning bring the fresh manure, together with the dirty bedding, to the manure heap.

4. Spread it evenly by means of a hayfork over the manure heap.

5. Let no urine remain in the waterproof drains, but wash it out into the cement hole with water.

6. Never mix the manure with plaster of paris, sulphate of iron, or kainit, because these are unnecessary; also not with sulphuric acid or superphosphate, because these will damage the manure.

7. Moisten the manure heap often with drainage water.

The manure heap being high enough (never higher than 10 feet), it is covered with a layer of soil 6 inches thick, and remains in that position until the manure is brought into the soil.

Composition and Value—

The composition and the value of stable and kraal manure depends on three things:—

1. On the excrement and the urine of the animals.
2. On the bedding.
3. On the treatment of the manure.

Let us now shortly consider the excrement and urine of the different kinds of animals.

Pigs and cattle give a more watery manure, but greater quantities than horses and sheep. The former manure is cold and decomposes slowly, while the latter is warm and acts quickly. Much also depends on the condition of the animal. For instance, cattle which are being fattened will give a richer manure than cows in milk or work oxen. A young animal will not give as good a manure as an old one. The reason of this is obvious. In the latter case all the strength of the fodder is used for the forming of milk, for the performing of mechanical work, or for the bodily improvement and development of the young animal; while in the case of the fattened cattle a small part only of the fodder is turned into fat and remains as such in the animal, but the greatest part of the fodder leaves the body with the excrement.

The quantity of excrement which is yearly produced by stable animals has often been determined by scientists. The following figures give the average yearly production of plant food per stable animal:—

	Horse.	Cow.
Nitrogen	342 lb.	466 lb.
Phosphoric Acid ...	131 „	71 „
Potash	118 „	294 „

If we remember that one ton of nitrate of soda with 15 per cent. nitrogen, i.e. containing 300 lb. nitrogen, costs £14. 10s., then—

1 lb. nitrogen costs about 11d.;
1 lb. phosphoric acid about 32d.;
1 lb. potash about 43d.;

therefore the yearly production of excrement represents for—

	In Nitrogen.	In Phosphoric Acid.	In Potash.	Total.
1 Horse	342 × 11d. = £15 13 0	131 × 32d. = £1 15 0	118 × 43d. = £2 2 3	£19 10 9
1 Cow	466 × 11d. = £21 7 2	71 × 32d. = £0 19 0	294 × 43d. = £5 5 4	£27 11 6

If, therefore, two horses and two cows are kept stabled the whole year through enough manure should be obtained for about 6 morgen of vineyard. And if the same piece of vineyard is manured every second year, these four animals should produce enough manure for 12 morgen of vineyard of 120,000 vines at 3 ft. by 3 ft., or 54,000 vines at 4½ ft. by 4½ ft., or 43,000 vines at 5 ft. by 5 ft.

But nothing may then be lost, for from one-third to half of it is practically lost sometimes.

The urine, which often is lost for the most part, is very rich in nitrogen and also in potash. This appears clearly from the following figures. According to Boussingault the proportions of manure to urine (in stable animals) is as follows:—

	Milk Cow.	Horse.	Sheep.	Pig.
Excrement (Manure)	3½	10	1	1
Urine	1	1	1	3
Percentage of water in Manure ...	86	75	58	84

N.B.—By *manure* is meant here excrement *without urine*.

According to Andoynaud and Zacharewicz the composition of manure and urine is as follows:—

		Horse.	Cow.
In Urine	Nitrogen	15.2 per cent.	10.5 per cent.
	Phosphoric Acid...	trace.	trace.
	Potash	9.2 per cent.	13.6 per cent.
Excrement without Urine, i.e. Manure	Nitrogen	5.6 „	4.4 „
	Phosphoric Acid...	3.5 „	1.2 „
	Potash	1.0 „	0.4 „

These figures are calculated per 1000 parts urine and excrement. As a horse produces about ten times, and a cow about three and a half times, more excrement than urine, the proportions of the absolute quantities of the different kinds of plant food which these animals produce in their excrement and urine respectively are as follows:—

		Excrement.	Urine.	Percentage of Total Production present in Urine.
Horse	Nitrogen	10 × 5.6 = 56	15.2	21.4
	Phosphoric Acid ...	10 × 3.5 = 35	trace.	—
	Potash	10 × 1.0 = 10	9.2	47.2
Cow	Nitrogen	3½ × 4.4 = 15·4	10.5	40.5
	Phosphoric Acid ...	3½ × 1.2 = 4·2	trace.	—
	Potash	3½ × 0.4 = 1·4	13.6	90.7

It appears, therefore, that a total loss of all the urine from the horse means a loss of nearly half of the potash and of 0.2 of the nitrogen, while for the cow the loss would be nine-tenths and four-tenths respectively. There would be no loss of phosphoric acid.

According to Boussingault the daily production would be for a—

			Total.
Milk Cow ...	Excrement (manure) ...	62½ lb.	80½ lb.
	Urine	18 „	
Horse ...	Excrement (manure) ...	31 „	34 „
	Urine	3 „	
Sheep ...	Excrement (manure) ...	49 „	49 „
	Urine		
Pig ...	Excrement (manure) ...	2.2 „	8.9 „
	Urine	6.7 „	

Let us now shortly consider the

Bedding or " Bog ".—

Everybody will understand at once that much depends on the kind of bedding which is used, as it forms an important part of the real manure. As far as I know the following material is used for bedding in our country:—Straw, bullrushes (or something similar), slangbosjes, rhenosterbosjes, vineshoots, the refuse of plants such as beans, peas, etc.

Straw, although forming the best bedding, will be too expensive for the wine farmer; he has, however, his vineshoots, of which he does not as a rule make the best use. These can be ground with a suitable machine—many of which exist in Europe—and can then be used as bedding or as fodder. In this way the plant food contained in these shoots is returned to the vineyard. The above-mentioned small shrubs form also good bedding, which should have the following properties:—

(1) A great capacity for absorption; and
(2) contain much plant food.

If bedding is first ground a little its capacity for absorption is greatly increased thereby, and it will sooner form a firm heap and rot quicker.

Finally, the value of the manure depends on its treatment, which subject we have discussed previously under the heading " The Storage of Manure ".

It now remains for me to show the *average composition* of ripe (or rotten) kraal and stable manure. Although it varies much, the following average figures can be considered as fairly reliable:—

		One ton Kraal or Stable Manure contains:
Nitrogen ...	4–6 per 1000	8–12 lb.
Phosphoric Acid ...	2–3 per 1000	4– 6 lb.
Potash ...	5–7 per 1000	10–14 lb.

Here nitrogen, phosphoric acid, and potash stand in good proportion to each other, and therefore we have to do here with a complete manure. These figures refer to manure from six to twelve months' old. Fresh manure will contain less plant food *per ton of manure*, because the rotting or ripening of manure always causes a heavy loss in potash, and even heavier in nitrogen, but the quantity (that is the weight) of the manure is also decreased by nearly one-half, largely by moisture evaporation; therefore a ton of well-rotted manure contains more plant food than a ton of fresh manure. The manure should be kept as firm as possible in the kraal, and only loosened when it has to be brought to the vineyard. The bedding should be brought to the kraal in as fine a state as possible, and always one thin layer of it at a time. So soon as the manure is brought from the kraal to the vineyard it should be spread immediately and ploughed under. It should not be left lying about in the vineyard for weeks or months. Nine tons of manure per morgen of vineyard will mean one basket of manure (calculated at 30 lb.) for every six vines at 5 ft. by 5ft., or one basket between four vines every third row. This manure must be ploughed under, not too shallow, in May and June.

B.—Karoo Sheep Manure.

This manure differs from kraal or stable manure by its greater richness in plant food.

	Nitrogen.	Phosphoric Acid.	Potash.
1 ton fresh stable manure (1 year old) contains...	8–12 lb.	4–6 lb.	10–14 lb.
1 ton Karoo sheep manure contains	28 lb.	27 lb.	101 lb.

It will at once be seen from the above table that this manure is very *rich in potash*. The quantities of nitrogen and phosphoric acid also are not to be underrated.

That this manure is so rich in potash is not to be wondered at when we consider that most shrubs and grasses in the Karoo are fairly rich in potash. But there is more. The manure accumulates steadily in thick layers in the sheep kraals, where it is exposed to the hot rays of the sun, while the yearly rainfall is small. This necessarily results in the nitrogen evaporating for the greatest part into the air, while nearly all the potash remains.

This proves, however, that it would be quite wrong to use this manure *alone*. *It is not a complete manure*, as is the case with stable manure. We, therefore, must consider it as a source of potash, and add the missing quantities of nitrogen and phosphoric acid by means of other fertilizers, and in the first part of this article I have quoted the following formula:—

For one morgen of vineyard or 10,000 vines at 3 ft. by 3 ft.:—

500 lb. Government guano.
1500 lb. Karoo sheep manure.
350 lb. basic slag.

This formula contains the following quantities of plant food:—

	Nitrogen.	Phosphoric Acid.	Potash.
500 lb. Government guano	65–70 lb.	55 lb.	10 lb.
1500 lb. Karoo sheep manure	21 lb.	20 lb.	76 lb.
350 Basic slag	—	51 lb.	— —
Total	86–91 lb.	126 lb.	86 lb.

Here the guano thus covers the deficiency in nitrogen, while the deficiency in phosphoric acid is covered by the basic slag.

The quantity of phosphoric acid may appear unnecessarily high, but I had two reasons for adding so much. In the first instance, phosphoric acid, according to experiments made by Professor Wagner, of Darmstad, and others, exercises a favourable influence on the quality of the grapes and the wine, as also on the general condition of the vine.

In the second instance, basic slag contains nearly 40 per cent. of lime, and our vineyards are for the greatest part planted on soils which are deficient in lime. A comparative test could be made by leaving out the basic slag in one case, and by manuring a vineyard next to

the first, and completely similar in all respects, with a[11] the constituents of the formula. After a few years one would then see what is best.

Price.—If we take one ton Government guano to cost £6, and one ton Karoo sheep manure 12s. 6d., and one ton basic slag £4, then the component parts of the above formula would cost £2. 13s. 6d.

NOTE.—From different sides I have heard, and I also have seen it personally, that vineyards which have been manured with Karoo sheep manure after some years show alkaline patches here and there. I have noticed this phenomenon in rather shallow, sandy soil, with an underlayer of clay. I can explain these alkaline patches only by supposing (*a*) that too much Karoo sheep manure has been used, and *it should be weighed;* (*b*) that the manuring took place *too late in the season.*

This should be done in May or early in winter. Further, these alkaline patches generally appeared in shallow soils, which soon get too wet in winter and too dry in summer. I again wish to point out most emphatically that it is absolutely necessary *to carefully weigh* the manure, especially the intensive kinds of manures, such as Karoo sheep manure, guano, Karoo ash, and the different artificial fertilizers.

The farmer who does not want to do this has no need of a manure formula, but he has to be satisfied with the results which he obtains, and he alone is to blame for any failures.

An excellent weighing scale is the "Truck Scale", sold by Messrs. George Findlay & Co., at Capetown, at about £5. 10s.

C.—Guano.

Guano here means Government guano of the Union of South Africa. As is well known, guano is nothing else than the excrement of millions of sea birds, found on Ichaboe, Angra Pequena, and other islands along the coast of Great Namaqualand.

Guano is also found on the three Chincha Islands along the coast of Peru, and on many other islands on the west coast of South America. As the Chincha Islands once formed the principal source for guano, the latter was generally called Peruvian guano, although these islands contain no guano now.

Guano is found in places which are frequented by sea birds, and where little or no rain occurs. In these dry areas it accumulates and remains very rich in nitrogen. In areas where it is more exposed to rains, the principal value of the guano is its great percentage of phosphoric acid (up to 33 per cent.). Unhappily the greatest part of it is not so easily available for the plant, and therefore these phosphate guanos are not so valuable as the Peruvian guano.

Towards the middle of last century great quantities of Peruvian guano were sold in Europe, as it was the only source of nitrogen for the European farmer, next to his stable manure. This Peruvian guano then contained 14 to 15 per cent. nitrogen. In 1856 the imports into Europe amounted to 342,000 tons, and in 1870 to 522,000 tons. (I am indebted for these figures and some other facts about guano to "Winkler Prins, Illustrated Encyclopedia", third edition.)

The nitrogen in guano works very rapidly, as it is mostly present in very soluble forms (ammoniacal compositions, uric acid, ureum).

Further, Peruvian guano contains 8 to 13 per cent. phosphoric acid, of which 7 to 8 per cent. is soluble in water or in a solution of ammonium citrate, and 1 to 4 per cent. potash.

Our Government guano contains on an average 13 to 14 per cent. nitrogen, 11 per cent. phosphoric acid, 2 per cent. potash. Peruvian guano is generally first treated with sulphuric acid in order to prevent loss of ammonia, and is then sold as dissolved guano.

In the west and south-west of Germany great quantities of ground guano are still bought for the manuring of vineyards under the following names:—

1. Peruvian guano No. 1, containing 7 per cent. nitrogen, 14 per cent. phosphoric acid, and 1 to 2 per cent. potash.

2. Peruvian guano No. 2, guaranteed to contain 4 per cent. nitrogen. 20 per cent. phosphoric acid, and 2 to 3 per cent. potash.

3. Dissolved Peruvian guano, containing 5 to 7 per cent. nitrogen, 10 to 11 per cent. phosphoric acid (of which 9 to 10 per cent. is soluble in water), and 1 to 2 per cent. potash.

At present the last-named sort is nearly exclusively bought (Passon, "Kleines Handwörterbuch der Agrikulturchemie", Vol. 2, page 133). It will be seen that our guano contains nearly as much potash and phosphoric acid and twice as much nitrogen as the last-named kind of guano.

To conclude, here is another extract from "Winkler Prins Encyclopedia", Vol. 8, page 546:—"Guano not only gives its own food to the plant, but by its nitrogenous components it has a decomposing effect on the soil. If, therefore, an acre contains sufficient plant food for the crop that it has to carry, the guano has the power to separate this plant food from the compound, and render it available for the plant. To this fact guano owes its reputation as a general fertilizer. It is, however, obvious that *thereby the soil gets soon exhausted*, and farmers who in the beginning get splendid results with guano, if they continue to utilize it as a fertilizer, will have to be satisfied with smaller crops, unless they add another fertilizer in sufficient quantity. For this reason guano is at present used as a supplement for an ordinary fertilizer or in conjunction with those which especially contain alkaline salts and phosphates. Furthermore, guano is very useful for improving the growth of weak and tender plants, while it also keeps insects in check."

Fish guano is prepared along the coasts of the North Sea from small fish and fish refuse (specially from sardines and whales) or from dead fishes washed ashore. These are dried and then ground. Sometimes they are steamed. Norway, where most of the fish guano is made, exported in 1876-77 about 5000 tons.

According to Müntz and Girard, fish guano contains

6 to 6.9 per cent. nitrogen.
5.5 to 13.8 per cent. phosphoric acid.
1 to 10 per cent. alkaline salts.

Thus fish guano is especially rich in nitrogen and phosphoric acid, and poor in potash. The nitrogen is very soluble, and therefore fish guano has a rapid effect.

Crayfish guano is made from crayfish refuse by treating it with steam or sulphuric acid, and then drying and grinding it. This guano contains about 11 per cent. nitrogen and 2.5 per cent. phosphoric acid. It is a good nitrogen source, and its effect is rapid.

Mr. Stewart, from the Paarl, intends to manufacture these two kinds of guano and to bring them on the market. Whether they will sell depends entirely on their price. In any case, they form excellent sources of nitrogen.

Phosphate Guano (see Phosphates).

D.—Dried Blood or Blood Meal.

This is made from blood obtained in great quantities from the abattoirs or central slaughter poles in the large cities. This blood is treated with steam in order to separate the albumen from the blood substance. At the same time the mass is continuously stirred. The liquid matter is then allowed to run off (through a false bottom), and the sediment is pressed, dried, and ground.

Another method is to add 1½ to 3 per cent, unslaked lime to the blood. This causes the blood to coagulate into a huge cake, which is dried in the air and then ground. The lime must be added gradually and the mixture continually stirred. If this is done, there will be no disagreeable smell, and no nitrogen will be lost. In no case more than 3 per cent. lime should be added, as too much lime will cause a loss in nitrogen.

In the first method a bad smell is produced. In large cities it is therefore necessary to add ferri-sulphate to the fresh blood in order to prevent these bad smells. Ferri-sulphate is obtained by mixing certain quantities of ferro-sulphate, nitrate of soda, and sulphuric acid.

Blood meal is brought on the market in the form of a reddish brown meal or as black or brownish grains. As it is not always of uniform purity and dryness, it is necessary to determine at least its nitrogenous content in order to find out its value. The percentage should be as follows:—

Nitrogen, 10 to 15 per cent.
Phosphoric acid, 0.5 to 1.5 per cent.
Potash, 0.6 to 0.8 per cent.

From 550 to 730 lb. blood meal per morgen of vineyard are used, according to its nitrogen content.

The nitrogen in blood meal acts quickly, although not as rapidly as that of nitrate of soda and sulphate of ammonia. It should be applied to the soil in May-June, and should be kept dry, because it produces ammonia if it gets moist.

The above figures show clearly that we have here a nitrogenous manure. In order to make a complete manure of it, the following formula might be employed:—

	Nitrogen.	Phosphoric Acid.	Potash.
700 lb. Blood meal (12 per cent. nitrogen) ...	84 lb.	7 lb.	5 lb.
700 lb. Fresh Karoo ash	—	23 „	87 „
600 lb. Basic slag (15 per cent. nitrogen) ...	—	90 „	—
2000 lb.	84 lb.	120 lb.	92 lb.

This formula will cost:

700 lb. Blood meal (12 per cent nitrogen) about	£2	11	0
700 lb. Fresh Karoo ash	0	9	0
600 lb. Basic slag	1	4	0
Total	£4	4	0

If the basic slag be left out it will still cost £3 to manure in this way one morgen of vineyard. I calculated one ton of blood meal of 12 per cent. nitrogen at about £7. 6s.

As soon as the intended central abattoir at Capetown becomes a reality I am convinced that blood meal will be manufactured there and brought on the market.

E.—Green Manuring.

This means the ploughing under of green, succulent crops, in order to enrich the soil with humus-forming or organic matter, and also with nitrogen. The most suitable crops for this purpose are the leguminous crops, because these add considerable nitrogen to the soil by their symbiosis with the nitrogen-fixing bacteria. These plants have on their roots tubercles in which the said bacteria live and perform their work of fixing the free nitrogen of the air. Among the nitrogen-gathering leguminous plants we have lupins, peas, seradella, vetches, and clovers, whilst other nitrogen-gathering plants are yellow mustard, buckwheat, and rye.

It is therefore obvious that where leguminous crops will thrive these should be given the preference above all others for green manuring.

Green manuring is principally done on poor, light, sandy soils, but it can also be recommended for light, clay soils. The crops are ploughed under when they are in full flower. In heavy, clay soils green manuring will not do much good. The principal advantages derived from green manuring are:—

(*a*) Enriching the soils with nitrogen by leguminous crops. How much nitrogen these can gather is shown in the following figures from Schultz-Lupitz. These figures give the quantities of nitrogen present in the upper and underground parts of the crops planted for green manuring per morgen of cultivated land:—

For peas	...	413 lb. nitrogen per morgen.
For blue lupins ...	...	352 lb. „ „
For white lupins	...	339 lb. „ „
For yellow lupins	...	265 lb. „ „

(*b*) By the action of the roots of the green manure crops, the mineral plant food in the soil is rendered more available for the plants. In this way plant food from the sub-soil is brought into the humus.

(*c*) Weeds are kept under and the soil is kept moist.

(*d*) The green plants which are ploughed under rot rapidly in the soil, and their plant food is then present in the soil in a more available form.

The crops planted for green manuring must be manured with a little nitrogen and much potash and phosphoric acid. Different soils require different crops.

Green manuring is necessary where kraal and stable manure are not available. The crops are sown in autumn and ploughed under in spring as soon as they begin to flower.

Whether green manuring can be applied to our vineyards must, as far as I know, still be proved.

II.—CHEMICAL OR INORGANIC FERTILIZERS.

A.—Sulphate of Ammonia.

The principal sources for the manufacture of sulphate of ammonia are coke factories and gasworks. By heating coal and excluding air, many gases are formed, and also ammonia, which latter is removed by means of water. From the water the ammonia is extracted by heating the water with or without lime, and by binding the volatile ammonia to sulphuric acid. In 1886 the Paris gasworks used 1,000,000 tons of coal and extracted from gaswater over 8000 tons of sulphate of ammonia. Coal generally contains 1 per cent. nitrogen, which, however, is lost through ammonia. Coke factories also furnish great quantities of sulphate of ammonia. According to Winkler, this quantity can be estimated at about 68,000 tons yearly.

The sulphate of ammonia which is in the market for fertilizing purposes has generally a greyish white, greenish, and sometimes brownish colour. It should contain

(*a*) 20 to 21 per cent. nitrogen;
(*b*) little or no sulphuric acid;
(*c*) no rhodanogen nor cyanogen compounds.

The substances named under (*b*) and (*c*) are poisonous for plants, and should under no conditions be brought into the soil. Those who use sulphate of ammonia as a fertilizer must satisfy themselves on these three points when buying. They should ask a guarantee as to its purity and its nitrogen content.

Whether the plant is able to absorb the ammonia directly, or whether a previous nitrification (i.e. the changing of ammonia-nitrogen into nitrate-nitrogen) is necessary, is a question which has not been completely solved. The attentive farmer, however, will soon observe that sulphate of ammonia acts nearly as rapidly as nitrate of soda in soils which are fairly rich in lime. If they are poor in lime it works very steadily. In such cases it will be well to add, a few months before, slaked lime to the soil and plough it under, but not too deep. The lime should be ploughed under in April, and the sulphate of ammonia not before June. The slaked lime then changes in the soil into calcium carbonate or limestone, and later on forms again in conjunction with sulphate of ammonia what is called ammonia carbonate and calcium sulphate. Therefore, it would be better in this case to add ground limestone instead of slaked lime. In any case, sulphate of ammonia may never be mixed with lime It should be borne in mind that sulphate of ammonia is exclusively a nitrogen fertilizer which acts steadily in soils deficient in lime, and that the price of its nitrogen is much higher than that of the Government guano. The average price is about £18 per ton (with 20 per cent. nitrogen), while Government guano costs £6 per ton. After deduction of the value of the potash and the phosphoric acid, the nitrogen in Government guano costs less than £2. 5s. per ton of 13 to 14 per cent.

nitrogen. Therefore the same quantity of nitrogen in sulphate of ammonia costs nearly five times as much as that of Government guano.

B.—Nitrate of Soda.

The principal sources of nitrate of soda are the rainless areas in Peru, Chili, and Bolivia, especially the Province of Tarapaia and the desert of Atakama. There are found pure layers of nitrate of soda 1 to 5 feet thick. These layers are situated on an impenetrable layer of clay, and are covered by a thick and firm layer of soil 1½ to 2½ feet thick, composed of clay and sand, and mixed with other stones and salts. In some places the layers of nitrate of soda are uncovered, but generally they are covered, and then a hole is bored through the covering layer as well as through the layer of nitrate of soda until the clay layer is reached. This hole is enlarged until it is able to contain 400 lb. gunpowder. The explosion of this powder tears away great pieces of the covering layer, whereby the layer of nitrate of soda is exposed. The raw saltpetre is broken into pieces and then treated in boiling water. When the water has partly evaporated and the deposit has crystallized by cooling, the crystals are washed with cold water, and then sun-dried; this forms the commercial saltpetre.

This saltpetre contains generally 94 to 97 per cent nitrate of soda, i.e. 15.4 to 16 per cent. nitrogen. The commercial Chili saltpetre contains generally 15 to 15.5 per cent. nitrogen. As it is sold according to its nitrogen content it is of the greatest importance that the latter should be guaranteed by the seller.

Besides other ingredients, the raw saltpetre contains potassium perchlorate, which is poisonous for plants. Chili saltpetre containing one or more per cent. of perchlorate, should never be bought.

On account of its hygroscopic properties, it is generally moist, and contains 2 to 3 per cent. of water. It should, therefore, be kept in a dry place, and no greater quantities should be bought than are necessary for immediate use. Mixed with superphosphates it develops nitric vapours, which means loss of nitrogen, and this should be prevented.

As Chili saltpetre is soluble in water, and is not retained by the soil, it should be applied after the heavy rains in spring, i.e. August here with us. It acts quickly and intensively, and promotes a luxuriant growth. The presence of lime in the soil is not so necessary in this case as it is with sulphate of ammonia.

As it is easily washed out from the soil, it should always be applied for one year only. On light, sandy soils it is of little use, as it is washed out too easily.

In 1895 the export of Chili saltpetre amounted to 1,375,000 tons, and it is estimated that the saltpetrefields in South America will be exhausted in thirty years. This would be a sad prospect for the farmer if the scientists had not found out in the meantime how to fix the great quantities of nitrogen contained in the air, and make it available for plant food.

The price of Chili saltpetre (15 per cent. nitrogen) is about £14. 10s. per ton. Therefore the nitrogen contained therein costs here also more than five times as much as that in Government guano. It should always be remembered that Chili saltpetre is only a nitrogen fertilizer.

C.—Nitrate of Lime or Lime Saltpetre.

For some years past nitric acid and nitrate of lime have been manufactured in great quantities by means of electricity. The discovery how to combine the nitrogen of the air with oxygen, thus manufacturing nitric acid, was made by Birkeland and Eyde in Norway, where factories exist now, which, by means of water, are supplied with cheap electrical power. The more the methods of manufacture improve the cheaper nitrate of lime or lime saltpetre will become.

In America, Bradley and Lovejoy found out a similar method, which, however, does not give the same favourable results as the Norway method, and the factory which was erected at the Niagara Falls has already stopped working.

The nitrate of lime obtained in this way has the same favourable effect as Chili saltpetre, and therefore all depends on the price. This nitrate is also very hygroscopic (i.e. it attracts water) and must therefore be kept in a dry place.

D.—Lime Nitrogen.

When it was discovered that the saltpetrefields in South America could not last more than about thirty years every effort was made to utilize some portion of the enormous quantity of nitrogen which is known to be present in the atmosphere, and to make it available for plant food. We have already seen that it is possible by means of electric power to combine the air nitrogen with oxygen, and thereby manufacture a lime saltpetre. Lime-nitrogen is another artificial fertilizer, the nitrogen of which has been taken from the air. If air is conducted over copper shavings, heated to 400°, the oxygen is fixed, and a current of nearly pure nitrogen is obtained. This nitrogen (obtained from the air) is further conducted over red-hot calcium carbide (in melting furnaces), or it is allowed to act directly on a mixture of lime and coal in an electrical furnace.

Lime-nitrogen has the following composition, $CaCN^2$, and is therefore nothing else than calcium cyanamide.

Lime-nitrogen contains from 15 to 23 per cent. of nitrogen. In the north of Italy, where water power is easily obtainable, the Cyanide Company has erected a factory which originally was able to produce yearly 4400 tons of lime-nitrogen. In 1907 the company was, however, obliged to extend the factory, and the yearly production amounted to 20,000 tons.

In Saxony a factory has been erected for the manufacture of lime-nitrogen according to the above-mentioned methods. The nitrogen in that product costs about one penny cheaper than in Chili saltpetre and sulphate of ammonia. Lime-nitrogen must be kept dry.

This fertilizer is generally not so suitable for acid soils, containing few bacteria. In other soils, however, it acts splendidly. By the working of the bacteria, if water is present in the soil, lime-nitrogen is changed into ureum and lime. Ureum is further changed into ammonia carbonate. The bacteria which accomplish these changes are ureum-bacteria. Therefore lime-nitrogen gives excellent results on soils which have been well manured with stable manure, and therefore are rich in bacteria.

To such soils from 280 to 560 lb. lime-nitrogen can be applied. This must be done in July, when the upper layer of humus is rather

dry and cool. As it is very fine, lime-nitrogen must be mixed by half with dry soil, then spread evenly over the land and ploughed under immediately. As lime-nitrogen is only a nitrogen fertilizer, potash and phosphate must be added. The latter should be basic slag, and no acid superphosphate. Lime-nitrogen should also be bought according to its nitrogen content.

As the last source for nitrogen I wish to mention ammonia, which can now be prepared from its elements, nitrogen and hydrogen. Here the nitrogen can also be taken from the air, and hydrogen can be obtained by electrical power from water. It will, therefore, be possible by further improvements of the existing methods to procure the farmer fixed nitrogen at a much cheaper price than is possible at the present moment.

E.—Potassic Fertilizers.

The principal sources for alkaline salts are the kalium layers at Stassfurt and surrounding country. Formerly these salts were considered as of no value, and were called "Abraumsalze" (removal salts), because they had first to be removed in order to get at the enormous rock salt layers. Later on the value of these salts for agricultural purposes was discovered, and they became the principal source of potassic fertilizers. The Stassfurt salts are used over the whole world as a kalium fertilizer. They are commercially known as

1. *Kainit*, with an average of 12½ per cent. kalium (potash), is a compound salt of kalium sulphate and magnesium sulphate and chloride with crystallized water. The presence of magnesium chloride renders this salt hygroscopic, and therefore it often, if kept long, changes into a firm lump, which must be ground before it can be used. From the above it will be seen that kainit contains as much potash as fresh kraal ash. In the case of kainit, however, the unit of potash costs nearly three times as much as in the case of fresh kraal ash.

2. *Muriate of Potash (Kali) or "40 per cent. Kalifertilizer-salt"*, containing 40 per cent. kali (potash), is prepared from the raw salts from Stassfurt, and must be used only in porous soils rather rich in lime, and in such areas where there is no danger of long drought. This should always be applied in autumn (April-May).

3. *Sulphate of Potash*, with 50 to 51 per cent. potash, is obtained from kainit and from the ashes of certain sea-plants. When buying this fertilizer one must obtain a guarantee that it contains at least 50 per cent. *soluble* potash, as there are many imitations in the market. This salt acts on the lime in the soil by forming kalium carbonate and sulphuret of calcium. In granite soils and in soils poor in lime, lime should be applied from time to time if this salt is used as a potassic fertilizer.

As this salt does not contain any quantities of chloride worth mentioning, it can be used for plants which cannot stand chlorides, for instance tobacco.

In sandy soils which are deficient in humus and clay this fertilizer must not be applied too early in the season: it should be applied in the latter half of July. In other soils it can be applied in May and June.

This fertilizer contains four times as much potash as fresh kraal ash, but taken in equal quantities this potash costs twelve times as much as that of fresh kraal ash.

4. *Kraal Ash* (with about 12½ per cent. potash).—It is obtained from Karoo sheep manure by burning the latter. This ash contains potash, lime, and phosphoric acid as plant foods, of which potash is by far the most important. It is also of moment that the potash is mostly present in the form of carbonate, i.e. in the form in which it is most active and cannot easily be washed away. Therefore kraal ash can be used in soils which are deficient in lime, as is the case with many soils in our wine districts. For these reasons, not to speak of its low price, kraal ash should be given the preference above the other kali salts.

5. *Ground Granite.*—Experiments have repeatedly been made with ground kali-silicates and stones, such as granite, etc. But the costs of transport have to be considered in this case, and, further, this potash is not easily soluble, and therefore acts very slowly. It is of course difficult to say whether methods will ever be discovered to render this potash more soluble.

F.—Phosphates.

Here we have principally to do with superphosphates, basic slag, and bone meal or phosphorites. These latter are seldom found in the market, but we will give a short description of the others.

(*a*) *Superphosphates—*

The use of superphosphates dates from the observation of Justus von Liebig in 1840 that broken bones, after having first been treated with sulphuric acid, give far more rapid and better results than the same bones which have not been thus treated. It is true superphosphates are still being prepared from bones, but the great majority of superphosphates are now being obtained from mineral phosphates. These consist for the greatest part (up to 85 per cent.) of phosphoric lime, i.e. tricalcium phosphate. This is the same compound which is also found in bones. As the tricalcium phosphate is, however, not soluble in water, it must first be treated with sulphuric acid to convert it into mono-calcium phosphate, which is easily soluble in water. On this reaction the whole manufacture of superphosphate is principally based.

The mineral phosphates are being supplied from the phosphate mines in comparatively small quantities. These mines are principally situated in Algeria, Florida, and on the Christmas Islands. These mineral phosphates are ground fine between steel cylinders. A sample is taken from the fine phosphate meal for chemical analysis. From the chemical composition the quantity of sulphuric acid, diluted with the necessary amount of water which should be added to every 100 lb. of phosphate meal, is calculated. In the October issue of *De Natuur*, 1910, an interesting article appears on the preparation of superphosphates in a factory at Amsterdam, from which article I here quote some particulars. After having discussed the above calculation, the writer states in connection with the preparation of superphosphates:—

"The ingredients are mixed in an iron reservoir, in which the carefully measured amount of sulphuric acid slowly flows from a leaden tank while the weighed phosphate meal is being conveyed into the reservoir. Both of the ingredients are now mixed thoroughly for half a minute. A valve is now opened, and the half-liquid mixture flows into a great cellar. Here the chemical combination takes place.

After from four to five hours this has been completed, and the now formed superphosphate can be removed from the cellar. During that time it has become quite dry and hard. . . . The cellar is, however, not emptied before it has been completely filled by a repeatedly renewed supply from the reservoir. This happens after three hours; it then contains 60,000 kg., i.e. 66 tons of superphosphate. . . . As already stated, the superphosphate forms as soon as it is taken from the cellar a dry, hard substance. A machine now scrapes it into fine granules, and it is then brought by means of an elevator to a sieve-apparatus, which removes everything that is not fine enough yet. Taken between the fingers it is granular, not mealy nor sticky to the touch. The colour of the superphosphate is widely divergent, but this has no effect on its value. Generally it is light yellowish grey, and sometimes darkish grey. In the latter case it has been prepared from Algerian phosphate."

In Germany superphosphates are only bought according to their percentage of phosphoric acid soluble in water. Good superphosphates ordinarily contain from 15 to 19 per cent. of phosphoric acid soluble in water, and only 1½ to 2 per cent. non-soluble in water.

In the soil an appreciable quantity of soluble phosphoric acid is speedily converted into the not easily soluble form. It, however, being finely divided in the soil, the roots of the plants come into close touch with it, and consequently this otherwise not easily soluble form is speedily dissolved and absorbed by the roots. This is where the superiority of the superphosphates above all other phosphates comes in.

The phosphoric acid being more expensive in superphosphates than in all other phosphates, one is advised to be sparing with it. In acid grounds superphosphates should not be used, as other cheaper phosphates often give better results.

For vines which are a permanent crop, and can therefore in course of time profit from not easily soluble phosphates, superphosphates are not so necessary as for grain, etc., which require a speedy effect.

Superphosphates are also prepared from bones. These superphosphates are not reconverted in the soil into a less soluble form. It would, however, be foolish to pay a higher price for these on account of this than for the mineral superphosphates.

In 1899 in Germany alone about 900,000 tons of superphosphates were used for manuring purposes.

Amonia Superphosphate is prepared by mixing the calcium superphosphate with ammonia sulphate. In this way a nitrogen and a phosphoric acid fertilizer is obtained simultaneously.

"*Dissolved Bones*" contain, in addition to from 9 to 11 per cent. phosphoric acid soluble in water, also from 3 to 4 per cent. nitrogen in a not easily soluble form.

(b) Basic Slag—

As many iron ores contain up to 1 per cent. phosphoric acid, this phosphorus has to be removed from the crude iron for the manufacture of steel. For this purpose the method of Thomas and Gilchrist is generally applied. Hence the name "Thomas phosphate". The farmers here generally call it "iron guano", which name implies its origin from iron ore. The English name "basic slag" owes its name to the slags produced by the manufacture of steel, and containing

much lime, thus showing a basic (and not an acid) reaction. The superhosphates, for instance, show an acid reaction.

In the case of the basic method of steel manufacture, lime or dolomite is added to the crude or cast iron, and air is forced into the molten mass. Phosphorus and silica are thereby oxidized and get into the slag. This slag is ground fine and then sold. Basic slag is generally of a dark blue or dark grey colour, sometimes of a brownish hue. Its value depends not only on its phosphoric acid percentage, but also on its fineness.

In addition to from 10 to 12 per cent. iron oxide, basic slag also contains 40 per cent. very active lime.

Its phosphoric acid percentage varies considerably. It contains from 6 to 12 per cent. phosphoric acid. The fertilizing value of basic slag is calculated according to its percentage of phosphoric acid, which is soluble in water or in a solution of 2 per cent. of citric acid. This prevents the adulteration of basic slag with crude mineral phosphates.

For acid, and especially light sandy soils, basic slag is by far the best phosphate fertilizer. The phosphoric acid acts rather quickly in this case. This depends for the greatest part on the fineness of the meal, 75 to 80 per cent. of which should pass through a sieve No. 100.

Basic slag acts much more slowly than superphosphate, and should be applied in autumn or early in winter. The effect of its phosphoric acid soluble in citric acid is on an average estimated to be equal to 90 per cent. of the phosphoric acid soluble in water. Thus the same effect will be obtained with basic slag containing 10 per cent. of phosphoric acid soluble in citric acid as with a superphosphate containing 9 per cent. of phosphoric acid soluble in water.

I have already referred to the favourable effect of fertilizing with phosphoric acid. It should, however, be borne in mind that basic slag and other phosphates are not complete fertilizers. They should, therefore, be applied in conjunction with nitrogen and potash fertilizers.

(*c*) *Bone Meal*—

In this case much depends on the fineness. The action is slow but lasting. The crude material often contains from 5 to 6 per cent. of nitrogen, which acts stronger than phosphoric acid, of which generally 16 per cent. approximately is present.

G.—Lime.

The good effect of lime on the humus can be (1) plant nourishment, (2) physical, (3) chemical, and (4) bacteriological improvement of the layer of humus.

(1) *Lime as a Plant Food*—

The different crops take different quantities of lime from the soil. Lucerne takes nearly sixteen times as much lime from the soil as potatoes (respectively 466 lb. and 28 lb. per morgen). A simple calculation will show us that nearly all soils contain a sufficient quantity of lime as a plant food for a considerable time. The different phosphates will, therefore, bring sufficient lime in the soil. As a fertilization with lime has a very good effect indeed, its main influence does not lie in its nutritive value.

(2) *Lime improves the Physical and Chemical Composition of the Humus—*

Heavy, compact soils are rendered loose and porous by lime, so that air and water are better able to penetrate the soil. For heavy soils slaked lime is the best, but for light soils carbonic lime is more suitable.

By fertilization with lime the power of the soil for absorbing the principal plant foods is increased—an important factor in the fertilization with saltpetre.

(3) *Lime Increases the Chemical Processes of the Soil—*

This applies particularly to slaked lime. Especially is potash thereby converted from its non-soluble compounds into soluble forms, so that fertilization with lime can be called an indirect kali fertilization.

We have already seen that most of the kali salts only act well when there is no great deficiency of lime in the soil. As the kali salts render the soil poor in lime the kali fertilization must be accompanied by a lime fertilization. A surplus of lime in the soil is necessary in order to neutralize the acids liberated from the kali salts, as these would have a detrimental effect on the plants.

Lime is also necessary for preventing a surplus of humus acids in the soil. There sometimes arises in the soil ferro-sulphate, which is poisonous to the plants. The lime changes into ferro-hydroxide, which is soon converted into ferric-hydroxide. The latter is a valuable plant food.

(4) *Lime Increases the Activity of Bacteria in the Soil—*

This results from the lime neutralizing the acids, which would otherwise have a bad effect on the bacteria produced by themselves. This applies particularly to the nitrogen fixing bacteria. With this end in view it is better to give limestone, i.e. carbonate, in order to prevent the formation of free ammonia in the soil. It is a well-known fact that a strong nitrification takes place only in comparatively lime-free soils.

Three tons of lime per morgen of vineyard should be given early in the winter. The lime is sown broadcast and can settle into the ground with the rains or can be ploughed under.

Union Irrigation Department.

ADVICE TO FARMERS.

THE subjoined table showing the postal and telegraphic addresses of the Circle Engineers of the Irrigation Department and the districts embraced within each Irrigation Circle is published for general information in connection with Government Notice No. 274 of 1911, in terms of which engineering advice may be obtained by farmers in connection with irrigation matters.

Copies of the Government Notice above referred to, with forms of application for engineering advice, may be obtained upon application to any of the Circle Engineers or to the Acting Director of Irrigation, P.O. Box 444, Pretoria.

F. E. KANTHACK,
Acting Director of Irrigation.

CIRCLE AREAS.

CAPE CIRCLE.

Headquarters: Capetown.
Postal Address: P.O. Box 23, Capetown.
Telegraphic Address: Irrigation, Capetown.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Beaufort West, Laingsburg, Worcester, Tulbagh, Piquetberg, Malmesbury, Cape, Stellenbosch, Paarl, Caledon, Robertson, Montagu, Bredasdorp, Swellendam, Ladismith, Riversdale, Mossel Bay, George, Oudtshoorn, Prince Albert, Knysna, and part of Uniondale within Olifant's River Catchment Area.

MIDLAND CIRCLE.

Headquarters: Cradock.
Postal Address: P.O. Box 40, Cradock.
Telegraphic Address: Irrigation, Cradock.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Umzimkulu, Mount Currie, Matatiela, Mount Fletcher, Maclear, Elliot, Xalanga, Glen Grey, Queenstown, Tarka, Cradock, and part of Steynsburg and Middelburg. Whole districts of Graaff-Reinet, Murraysburg, Aberdeen, Willowmore, and part of Uniondale. Whole districts of Humansdorp, Port Elizabeth, Uitenhage, Alexandria, Bathurst, Peddie, East London, Komgha, Kentani, Willowvale, Elliotdale, Mqanduli, Ngqeleni, Port St. John, Lusikisiki, Bizana, Flag Staff, Mount Ayliff, Mount Frere, Tabankulu, Libode, Qumbu, Tsolo, Umtata, Engcobo, St. Marks, Tsomo, Nqamakwe, Idutywa, Butterworth, Stutterheim, Cathcart, Adelaide, Fort Beaufort, Stockenstroom, Kingwilliamstown, Victoria East, Albany, Bedford, Somerset East, Jansenville, and Steytlerville.

UPPER ORANGE RIVER CIRCLE.

Headquarters: Bloemfontein.
Postal Address: P.O. Box 528, Bloemfontein.
Telegraphic Address: Cirgate, Bloemfontein.
Boundaries of Circle and Fiscal Districts included in same: Railway line and from Bloemfontein along watershed between Modder and Riet Rivers to junction and along Riet River, including both banks, to junction with Vaal. Whole districts of Herbert, Hopetown, Philipstown, Hanover, and area south of Orange River within its catchment, including part of Middelburg, Steynsburg, Molteno, Wodehouse, and whole districts of Barkly East, Herschel, Rouxville, Wepener, part of Ladybrand, Thaba 'Nchu, and Bloemfontein, south of railway line, also part of Bloemfontein and Fauresmith and Jacobsdal south of catchment between Modder and Riet Rivers. Whole districts of Phillippolis, Colesberg, Albert, Aliwal North, Smithfield, Edenburg, and Bethulie.

LOWER ORANGE RIVER CIRCLE.

Headquarters: Capetown.
Postal Address: P.O. Box 23, Capetown.
Telegraphic Address: Aqua, Capetown.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Griqualand, Gordonia, Kenhardt, Namaqualand, Port Nolloth, Van Rhynsdorp, Clanwilliam, Ceres, Sutherland, Fraserburg, Carnarvon, Victoria West, Richmond, Britstown, Prieska, and Calvinia.

POTCHEFSTROOM CIRCLE.

Headquarters: Potchefstroom.
Postal Address: P.O. Box 78, Potchefstroom.
Telegraphic Address: Irrigation, Potchefstroom.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Marico, Mafeking, Vryburg, Kuruman, Taungs, Wolmaransstad, Potchefstroom, Witwatersrand, and Lichtenburg.

STANDERTON CIRCLE.

Headquarters: Standerton.
Postal Address: P.O. Box 162 Standerton.
Telegraphic Address: Irrigation, Standerton.
Boundaries of Circle and Fiscal Districts included in same: Ermelo, Standerton, Heidelberg, and Wakkerstroom.

PRETORIA CIRCLE.

Headquarters: Pretoria.
Postal Address: P.O. Box 444, Pretoria.
Telegraphic Address: Circle, Pretoria.
Boundaries of Circle and Fiscal Districts included in same: Zoutpansberg, Waterberg, Rustenburg, Pretoria, Middelburg, Barberton, and Lydenburg.

NATAL CIRCLE.

Headquarters: Pietermaritzburg.
Postal Address: P.O. Box 344, Pietermaritzburg.
Telegraphic Address: Irrigation, Maritzburg.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Ingwavuma, Ubombo, Ngotshe, Paul Pietersburg, Vryheid, Utrecht, Newcastle, Dundee, Klip River, Upper Tugela, Estcourt, Impendhle, Underberg, Ipolela, Ixopo, Alfred, Lower Umzimkulu, Alexandra, Umluzi, Inanda, Lower Tugela, Umlalazi, Umfolozi, Hlabisa, Ndwandwe, Mahlabatini, Ngutu, Babanango, Nkandhla, Entonjaneni, Eshowe, Mapamulo, Krantzkop, Umsinga, Weenen, Umvoti, New Hanover, Indwedwe, Umgeni, Pietermaritzburg, Camperdown.

ORANGE FREE STATE CIRCLE.

Headquarters: Bloemfontein.
Postal Address: P.O. Box 528, Bloemfontein.
Telegraphic Address: Bloemfontein.
Boundaries of Circle and Fiscal Districts included in same: Whole districts of Vrede, Frankfort, Heilbron, Vredefort, Kroonstad, Hoopstad, Boshoff, Barkley West, Kimberley, and part of Jacobsdal, Fauresmith, and Bloemfontein, north of catchment between Modder and Riet Rivers, also part of Bloemfontein, Thaba 'Nchu, Ladybrand, north of railway line. Whole districts of Ficksburg, Bethlehem, Harrismith, Lindley, Senekal, and Winburg.

The Distribution of Temperature.

TRANSVAAL, ORANGE FREE STATE, AND NATAL.

THE following note on the distribution of temperature over the Transvaal and parts of Natal and the Orange Free State has been kindly furnished by Mr. R. T. A. Innes, the Director of the Transvaal Observatory, Johannesburg, in response to an inquiry from a correspondent. Mr. Innes remarks that his information as to the temperatures experienced in Natal and the Orange Free State is derived from reports published in those Provinces, and is rather limited.

As regards the distribution of temperature over the Transvaal Province (Mr. Innes writes), the coldest districts are Bethal, Standerton, Ermelo, Wakkerstroon, and the neighbourhood of Belfast.

This fact is well shown by the following table in which is given the annual mean temperature, the average maximum temperature, the average minimum temperature recorded during the year, and also the lowest for various places in the Transvaal, and also for Utrecht in Natal.

It will be noticed from this table that the temperature distribution over the Transvaal is very uniform, but changes with altitude. Thus: *Potchefstroom, Zeerust, Pretoria, Pietersburg,* and *Piet* Retief have very nearly the same temperature conditions; their altitudes lie between 3940 and 4430 feet. In quite a different class are Belfast, Bethal, Ermelo, Standerton, and Wakkerstroom. Here the mean annual temperature is about 5 degrees lower than that of the previously mentioned places, and the absolute minimum temperatures are much lower; the altitudes of these "colder" districts range from 5000 to 6000 feet roughly.

The temperature conditions at Piet Retief are very similar to those prevailing at Pietersburg, and it will be noticed that the altitudes of the two places are almost equal.

The altitude above sea-level of the Piet Retief District decreases very rapidly from west towards east. The western border of the district is almost 5000 feet above sea-level, whereas the east is below 2000 feet. Temperature conditions will accordingly change considerably across the district; frosts will be of frequent occurrence on the high levels, but very rare on the low ground.

Similar conditions will prevail over the Vryheid District, where frosts occasionally occur, but are rare.

The Vredefort District of the Orange Free State (P.O. Greenlands is in this area) has temperature conditions of the type prevailing over Standerton and Ermelo; short spells of very severe weather may be expected to occur two or three times a year between the months of June and September.

In brief, a farmer living on the high veld above the 4000-feet level in the Transvaal and Orange Free State must anticipate and be prepared for occasional spells of extremely cold weather, but if he would avoid these he must go down to lower levels in such districts as Piet Retief, Vryheid, or Swaziland.

Above the 4000-feet level the winter temperatures by night and early morning will generally be too low to permit cattle to thrive if left in the open.

TABLE SHOWING ANNUAL MEAN TEMPERATURE, AVERAGE MAXIMUM TEMPERATURE, AVERAGE MINIMUM TEMPERATURE, AND ALSO THE LOWEST, RECORDED DURING 1909–10 FOR VARIOUS PLACES IN THE TRANSVAAL, AND ALSO FOR UTRECHT IN NATAL.

Year 1909–10.	Potchefstroom.	Zeerust.	Pretoria.	Pietersburg.	Belfast.	Bethal.	Standerton.	Ermelo.	Wakkerstroom.	Piet Retief.	Vryheid (Natal).
	°	°	°	°	°	°	°	°	°	°	°
Mean annual temperature	62·5	64·3	63·5	63·4	65·1	57·9	57·1	58·3	56·3	62·1	66·4
Average maximum temperature	77·4	78·7	77·9	76·9	67·2	71·3	73·0	71·8	69·5	73·9	81·0
Average minimum temperature	47·6	49·8	49·0	49·9	43·0	44·5	41·1	44·8	43·0	50·3	51·8
Highest recorded during year	93·8	96·9	94·1	95·9	84·0	86·2	88·0	87·0	86·0	93·9	101·0
Lowest recorded during year	21·0	21·9	25·2	29·0	18·2	15·0	13·0	17·0	24·0	29·0	32·0
Altitude	4430	3940	4387	4130	6295	5200	4988	5570	5500	4000	

Western Province Agricultural Society.

FOURTH EGG-LAYING COMPETITION.

16th May, 1911, to 15th May, 1912.

Record for JUNE, 1911, and Totals to end of JUNE.

Pen Number.	Owner.	Breed. (Six Birds to a Pen.)	Record for Month. Eggs.	Record for Month. Weight. oz. dwts.	Total to Date. Eggs.	Total to Date. Weight. oz. dwts.	Position to Date.
1	F. W. Nicholson..	Buff Orpingtons.....	—	—	—	—	—
2	F. T. Hobbs	Silver Wyandottes.....	16	28 11	25	44 8	17th
3	A. Riley.....	Black Minorcas (R.C.).....	14	23 0	27	44 4	18th
4	N. Cole	White Leghorns (Amer.)	9	17 14	10	19 12	22nd
5	S. T. Jones	White Leghorns (Amer.)	20	40 14	30	60 14	12th
6	H. Curtis..	White Leghorns (Amer.)	12	31 9	32	68 6	9th
7	S. C. Skaife.....	White Wyandottes.....	—	—	—	—	—
8	A. Keppie.....	White Wyandottes.....	29	51 15	41	72 14	8th
9	S. A. West.....	White Leghorns (Amer.-Danish)	14	27 10	14	27 10	19th
10	H. H. Bright.....	Black Leghorns	33	64 0	33	64 0	11th
11	B. Kauffmann ...	Brown Leghorns	—	—	11	23 1	21st
12	B. Kauffmann ...	Black Leghorns	29	61 11	43	88 8	7th
13	C. W. Pilkington .	Rhode Island Reds	11	26 14	19	45 12	16th
14	W. P. Cowan	White Leghorns (Eng.).....	47	81 10	54	93 0	6th
15	A. J. Stacy.....	White Leghorns (Aust.-Amer.) (Re-entered from last competition for second year test.)	20	44 11	29	65 8	10th
16	B. Kauffmann ...	White Leghorns (Eng.-Amer.)..	47	92 2	90	177 8	1st
17	S. Smith	Brown Leghorns	7	12 8	13	23 1	21st
18	Mrs. H. H. Bright	White Leghorns (Aust.)	7	12 12	7	12 12	23rd
19	N. Cole	Brown Leghorns	28	61 11	47	101 11	5th
20	F. Molteno	White Leghorns (Amer.)	26	46 0	28	49 8	13th
21	C. H. van Breda..	White Leghorns (Aust.)	49	94 12	84	158 3	3rd
22	Mrs. C. H. van Breda	White Leghorns (Amer.).....	45	90 9	68	132 14	4th
23	S. A. West.....	Brown Leghorns	19	35 2	25	46 12	15th
24	Graham, Hope & Co.	White Wyandottes	13	25 6	13	25 6	20th
25	R. V. R. Jones ...	White Leghorns (Amer.-Aust.) .	4	7 15	4	7 15	24th
26	S. Smith	White Leghorns (Dan. & Amer.)	49	92 2	90	167 8	2nd

MANAGER'S REPORT FOR JUNE, 1911.

I regret to have to report a falling off in the number of eggs at a total of 548 for the month, as against 289 for the first fortnight of the competition (16th to 31st May). In my opinion the reasons for this are :—(1) The sudden and frequent changes, both in temperature and weather; (2) several birds that were laying well going into a partial moult; (3) it was found necessary to fix wooden screens to prevent the rain driving into the houses which took several days; (4) I was absent on the sick list for a week. The two latter reasons were alone sufficient to cause a drop in the number of eggs, for we all know what sensitive creatures fowls are, and how any alteration in their surroundings or the presence of strangers about them affects them. Another possible contributing cause is the fact that the pens are surrounded by oak trees from which are constantly falling small buds (especially at this time of the year), and to these the birds seem very partial; it may be that some substance in these, possibly a vegetable alkaloid, has a detrimental effect on the ovaries—they certainly give to the droppings a reddish-brown colour, such as tannin or gall would, both of which we know are strong astringents. The fact that some years ago I was able to prove beyond doubt that the consumption of beech-nuts by fowls had a detrimental effect on the egg yield, and gave to the yolks of the eggs the colour of varnish, leads me to entertain this suspicion. The Government Analytical Department has kindly promised to make an analysis of these oak tree buds, and it will be interesting to learn the result.

Seventy-nine birds have started to lay; two pens have still no eggs to their credit, although they are in the best of health.

Some of the birds which were not fully matured on arrival have come on very quickly; a few have started to lay, while others should do so any day now. In several pens three, four, and five birds have laid well, while their partners have failed to contribute a single egg, which bears out an opinion I have always held, that success in a laying competition is not due entirely to a good laying strain, but in a great degree to selecting the right birds from a flock of likely and well-bred pullets, and it is well to aim to have them just commencing to lay when they enter.

The total number of eggs for the month is 548, weighing 1081 ounces. The size of the eggs continues good, only one this month being under 1½ ounces. Two double-yolked eggs have been laid by No. 68, each weighing 2 ounces 10 drams, and by No. 124 one, also 2 ounces 10 drams.

Special mention should be made of No. 89 in Pen No. 15, an Australian-American leghorn in her second year. The total number of eggs to her credit for the six weeks is twenty-seven, weighing 61 ounces 3 drams (she always lays an egg well over 2 ounces), and yet she is gradually going through her moult, and will now soon be over it. Such a bird is invaluable as the foundation of a strain of good layers of large eggs.

The six birds that have laid the highest number of eggs for the month are:—Nos. 83 (eighteen), 89 (eighteen), 43 (seventeen), 81 (seventeen), 151 (seventeen), and 91 (sixteen); and up to date, 43 (twenty-nine), 89 (twenty-seven), 91 (twenty-five), 31 (twenty-three), 151 (twenty-two), and 11 and 156 (twenty-one). The six with the greatest weight for the month are:—Nos. 89 (40 ounces 6 drams), 151 (31 ounces 12 drams), 83 (31 ounces 2 drams), 43 (30 ounces 14 drams), 91 (28 ounces 9 drams), 112 (28 ounces 4 drams); and up to date, 89 (61 ounces 3 drams), 43 (51 ounces 12 drams), 30 (47 ounces 4 drams), 73 (45 ounces 12 drams), 91 (44 ounces 14 drams), and 96 (44 ounces 3 drams).

The health of the birds continues good. Nos. 98, 99, 120, 121, and 128 developed slight colds (No. 121 with a little emphysema), which were treated and cured at once. The secret, as every poultry breeder knows, is to spot this or any ailment at once, and treat at once, and so often a vast amount of trouble is saved. No. 151 developed lameness due to rheumatism of the left hock joint, which after three days' treatment disappeared. Nos. 82, 98, 108, 117, 127, 129, 152, 61, 62, 63, 64, 65, 66, 109, 110, and 111 are going through a partial moult, No. 89 through a full one, and Nos. 139, 140, 141, 142, and 143, which started a full moult shortly after arrival, are practically over it. This going into a partial moult is a great drawback to good egg records; I can only account for it as being due to the unseasonable and changeable weather. Each bird is treated at once to bring it through as quickly as possible.

The weather during the past week of the month was dull, cloudy, and damp, ending in heavy rain accompanied by north-west wind. Half the second week was hot and sultry; the other half dull and wet with north-west wind, and the nights very cold. The third week was fine and warm. The first part of the fourth, dull and wet with a cold south-east wind and the nights again very cold; during the remainder the days were fine, warm, and sunny, but becoming cold and rather damp as soon as the sun went down. Thus it will be noticed that the birds have experienced many changes in the weather and temperature, always a greater drawback to a heavy egg yield and good health than even continuous, very cold dry weather.

Correspondence.

This section will be set aside for correspondence on all subjects affecting the Farming Industries of the Union of South Africa and cognate matters; and, while every reasonable latitude will be allowed, contributors are requested to be as concise and succinct as possible in the expression of their views.

Suggestions for practical consideration and discussion, and hints as to improved methods applicable to any branch of agriculture will be particularly welcome.

It must at all times be distinctly understood that the Department of Agriculture is in no sense responsible for the views and opinions expressed in this section.

All communications should be clearly addressed "The Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria", and written on one side of the paper only.

INTRODUCTION OF TEFF GRASS.

To the EDITOR of the *Agricultural Journal*.

SIR,—I am sorry if I erred in my article in your April issue by claiming for our Botanist, Mr. Burtt-Davy, the honour of bringing this valuable grass to South Africa. I should have used the words "The Transvaal" instead of "South Africa"; we are so readily falling into the habit of thinking in terms of the Union that we are apt to forget our recent provincialism. The evidence led by the Director of the Natal Botanic Gardens is quite convincing, but, admitting that seed was introduced into Natal in 1887, I maintain that all trace of that seed has been lost, and it is from the few pounds distributed by Mr. Burtt-Davy in 1903 that so many thousands of tons of grass is now grown and so many head of hungry stock wintered on this nutritious forage. There is an old saying that the man who causes two blades of grass to grow where only one grew before has been of some benefit to humanity—and I say *palmam qui meruit ferat.*

It gives me great pleasure to repeat my offer of a package of seed for experimental purposes to any farmer in the Union who sends me sufficient stamps to defray postage, and I hope next year to be in a position to extend this offer to *Phalaris bulbosa*, another grass with which I am delighted.—Yours, etc.,

J. WENTWORTH-SYKES.

Grasslands, Natal Spruit, Transvaal.

BEE-KEEPERS' EXAMINATIONS.

To the EDITOR of the *Agricultural Journal*.

SIR,—As Mr. Chesterfield, the hon. secretary of the South African Bee-Keepers' Association, is evidently not very well informed regarding the examination of the two candidates referred to for expert certificates, kindly allow me to enlighten him on the subject, at least as far as I am personally concerned.

As no Bee-Keepers' Associations in South Africa were affiliated with the British Bee-Keepers' Association, it was therefore impossible for them to conduct examinations in this country. Inquiries made elicited the fact that there were only three certificated experts in South Africa, the nearest being Mrs. Stuart Russel, of Silverton. I then became a member of the British Bee-Keepers' Association, and it was arranged that Mr. J. L. Taylor (the other candidate) and myself be examined by Mrs. Russel. The examination took place in the presence of several persons and was openly conducted at Silverton. Now, Mr. Chesterfield is in error in saying that the examination was conducted so quietly that until it had taken place the Pretoria Association, as an association, had no knowledge of it. This is not a fact, as I will show. At a general meeting, at which Mr. Attridge was chairman, I announced to the meeting that I was being examined by Mrs. Russel, so that it was no secret or surprise to the Association.

At the same meeting I read extracts from a letter received from the Secretary of the British Bee-Keepers' Association, stating that they would be pleased to accept the Pretoria and District Bee-Keepers' Association in affiliation and that the fee would be £1. 1s. Before the meeting concluded it was unanimously resolved to apply for affiliation by the first outgoing mail, and that is how the first association in South Africa became affiliated with the parent body.

Regarding the Pretoria and District Bee-Keepers' Association being a purely local body, I may say that I enrolled more than 25 per cent. of its members, and therefore know that all are not residents of town or district.

Thanking you in anticipation for the insertion of this,—Yours, etc.,

Pretoria. D. CAIRNCROSS.

To the EDITOR of the *Agricultural Journal.*

SIR,—I regret troubling you again on this matter, but it does appear that I am a "bit mixed", now that so many have tried to enlighten me. It all happened this way. I read some time ago of the formation of the *Transvaal* Bee-keepers' Association, and when I noticed later a Mr. L. L. Hardwick writing as Hon. Sec., *South African* Bee-keepers' Association (Western Province), I naturally wondered if this could be a Cape Province Institution or another of our Northern Mushrooms. And now I am not enlightened enough to understand, seeing that a Mr. A. J. Chesterfield is the Hon. Sec. of the latter, and a Mr. F. Sworder or Mr. Blower of the former, with another provincial association thrown in; so of course I have now made up my mind that I cannot know everything and everybody, and so return to the *Examinations* and ask any of my kind informants if it is possible to get some forms of the examination papers as a guide to preparing oneself for such; for though my lifetime of bee-keeping and study (am over fifty now) has taught me many a secret a keen observer picks up, I may not be up to date (in the bee line one must keep going to get there) enough for the South African Bee-keepers' Association's Expert's Certificate; therefore I will be indebted to my best informed informants for such a form.

Thanks for the information already in hand through your kindness, and in anticipation for this which will be of great use to my friends here.—Yours, etc.,

Cape Province, 29th July, 1911. ICHNEUMON.

SUGGESTED CURE FOR CHICKEN-POX.

To the EDITOR of the *Agricultural Journal.*

SIR,—For the benefit of some of your correspondents who are inquiring for a cure for chicken-pox in poultry, I would like to recommend a cure that I have found very effective:—

1 oz. pure carbolic oil;
2 oz. camphor;

to be mixed together and bottled.

Mix thirty drops of the above with a sixpenny jar of vaseline and apply to the affected parts.

If this is done no isolation of the birds will be found necessary, and one application will generally be sufficient.

With this cure on hand chicken-pox need have no terrors for any one.—Yours, etc.,

Dewstone, Durban Road, Maritzburg. J. S. CLARKSON.

[The Department has not tried the above remedy and so is not in a position to express an opinion as to its merits, except to say that it appears to be quite safe to use.—Editor, *Agricultural Journal.*]

DATE CULTURE AT VAN RHYNSDORP.

To the EDITOR of the *Agricultural Journal.*

SIR,—I see in your issue for July, 1911, Mr. Gerard Rood, Van Rhynsdorp, Cape Province, asks the way for preserving dates.

The following should be some guide for him.

It is very rarely that all the dates on a bunch ripen at the same time; those which ripen first should be hand-picked, for if some are dead-ripe and some half-ripe at the time of curing or preserving they will not be uniform; that probably is the cause of Mr. Rood not getting his dates to keep. When the remainder of the bunch is beginning to ripen nicely cut it off, and hang it up in a dry and shady place. Remove any dates which are beginning to spoil before the bunches are hung up. It, however, greatly depends on the kind of date. The above has to do with a dry date, such as Deglet Noor. The dates must be allowed to dry thoroughly, often some weeks, according to kind. When thoroughly dry be sure to pack really tightly, as they keep better and prevent the natural moisture from drying out. They should keep years if properly handled. I know the district well, and should strongly advise planting large quantities, but be careful to plant good varieties, not rubbish, and only get the best.—Yours, etc.,

T. S. WATKINSON.

Cairn Siding, Nelspruit.

STOCK SALES IN SOUTH AFRICA.

To the EDITOR of the *Agricultural Journal.*

SIR,—In the *Agricultural Journal* for May I notice a letter from Mr. P. G. Leonard, of Kokstad, East Griqualand, on the subject of central stud stock sales.

It may interest some of your readers to know that the Central Agricultural Society of this Province will now hold a stud stock sale on the day after their annual show. The sale after the 1911 show was so markedly successful that entries are already being received for our sale, which will take place on the 19th or 20th of April, 1912.

Regarding the procedure in taking entries it has been decided to give stud-book stock precedence, and book in order of entry. Grade stock will be sold afterwards, also in order of entry.

This sale takes place on the Agricultural Show Ground, Bloemfontein, and the show ground has a railway siding.

I shall be pleased to supply any further information, and, when published, catalogues of the sale to correspondents.—Yours, etc.,

C. McG. JOHNSTON,
Secretary, Central Agricultural Society, O.F.S.

P.O. Box 377, Bloemfontein.

RAT EXTERMINATION.

To the EDITOR of the *Agricultural Journal.*

SIR,—Adverting to the articles by Messrs. Eagle and Bradfield on the above-mentioned subject I wish to state that I have tried all sorts of poisons, very effective in most cases, except in the case of the longtail rat. I tried pumpkin pips; they were good, but not quite effective. You see this fellow is as cute as the devil himself. A medical doctor then gave me the following advice, with good results. Take plaster of paris, mix half-and-half with flour, and place it in a spot which they are sure to get to; alongside of it put a receptacle with water. The next morning your heart will rejoice, whereas theirs will be cold in death. The next night remove the mixture to another spot; do not leave it for two nights in the same place. These fellows are socialists, and the moment they come across something nice the rest of the tribe is informed, and they say: "Let us eat and drink, etc.", with the result that a brick is formed inside, and their days are numbered. On the other hand they seem to know by instinct that death lurks there, and they go and look for pastures new, and that you must provide for also.—Yours, etc.,

Pretoria.

GID. F. JOUBERT.

BLUE GUM ROOTS.

To the EDITOR of the *Agricultural Journal.*

SIR,—In your last issue is a letter asking for information how to get rid of the extension of the roots of the blue gum tree, to which an answer was given, on expert authority, to remove the tree. Though I am not an expert, allow me to state facts of my own experience and a practice I have adopted with absolute success during the last forty-five years.

Where there are many trees and the owner can afford to lose one or more, then by all means uproot the tree, but where there are, as in most cases, few trees it is a great pity to remove them. Of all known trees there is none so healthy and so cooling as the gum. The oak is a cooling tree, provided there is a slight breeze or the trees are far apart, but the gum is cooling on the hottest day, though far or near apart and no breeze. It averts also fever, and wherever there is a gum there is no fever. This has been abundantly proved where the gum has been planted in marshy places and in fever beds. Rather than uproot the tree, adopt my suggestion. If the tree is too near a dwelling, or too near a fountain, or spread too far into your flower garden, cut a trench of about a spade broad and about two feet deep near the wall of the dwelling or of the spring or garden or any other spot you do not wish the roots to be; cut off the roots and leave the trench open for a month or six weeks; then put a sheet or sheets of corrugated iron in the trench *against the roots* and fill up the trench. In the meantime the roots abutting on the iron will either turn round towards the stem of the tree, or at any rate in the opposite direction away from the iron; but as at the joints of two or more sheets of iron rootlets might get through, to prevent this, or to remove them, open the trench at the end of every twelve months and cut off the new rootlets. There will be very few, still there may be some. The expense to see to this annually is a very trifling matter. The tree is preserved and its use and comfort also. Do the same with all other trees whose roots spread out far, such as the Kei-apple, the fir, the monotokko, and all other long-spreading roots. Where the soil is deep the roots of all those trees would rather go down than spread, but where the soil is shallow and poor the roots spread on the surface. Let your correspondent try my suggestion, and I shall be surprised to hear of his non-success.—Yours, etc.,

Capetown, 5th July, 1911.

AUSTRO-AFRICANO.

TEOSINTE.

To the EDITOR of the *Agricultural Journal.*

SIR,—Three years ago having a piece of land which I found too poor to grow anything on, I decided, as a last resort, to plant with a little teosinte, and, if that failed too, to give it up as a bad job. However, the teosinte did grow, and grew wonderfully, so I kept the seed and planted it again the next season, and produced a crop on the same land, without a particle of manure, standing 7 to 9 ft. high. All during the growing season I kept cutting it down and feeding my pigs with same. I cut all of it down three times before letting it go to seed, and some of it was cut five times. The months of November, December, and January I fed the pigs on nothing else. I was so pleased with the result of the crop that I wrote an article on it in the Agricultural Section of the *Natal Mercury.* Now, this last summer being so dry I did not expect much from the teosinte field, but, although planted on the same ground, except that I had increased the field by several acres and without a bit of manure or fertilizer of any sort, it came on with the new year and produced a splendid crop.

It is a magnificent fodder crop, for it stools out tremendously and, if planted in rows 3 ft. apart and 12 in. in the rows, it will grow so thick that it is impossible to walk through it. It is suitable for all stock, from ostriches and pigs to racehorses. In Mexico and Central America it is largely grown for hay; in Australia it is now being grown for ensilage, as it is considered unequalled, and in a report I received from a director of agriculture in Australia he stated that (to quote his words) "As a fodder crop it is equal, if not superior, to lucerne".

It is so easy to grow that every one ought to give it a trial.

Plant it in rows as previously stated, weed it once, and you will not need to weed it again.

When it first comes up it looks just like small mealies. Where there is little or no frost, the earlier it is planted the better. Here, on the coast, I plant the last week in July or first week in August, and can go on planting right up to the end of December. Up-country do not attempt to save for seed, for the seed does not ripen until May and June, and naturally it would be killed by frost. The plant will stand about three degrees of frost, but no more. Plant the same time as the first mealies after frost for up-country districts. It responds readily to superphosphate. The plant carries a very high percentage of nitrogen, and just before tasselling the stalks are quite sweet.

The seed can be obtained from most seedsmen, but Samuel Deane, of Durban, is handling large supplies of the seed this season, retailing at 1s. per lb., and large orders considerably less in price. One does not like mentioning the name of a person or firm in an article of this sort, for it savours of cheap advertising, but, speaking from my own experience, I have often wished when reading an agricultural paper that the place where a particular seed or implement could be obtained had been mentioned so that I could write direct and save time.

When sowing teosinte, use from 10 to 12 lb. and put from four to seven seeds in each hole, planting same depth as mealies. From my own experience it is not necessary to soak the seeds, for I find they germinate, if anything, faster than mealies.—Yours, etc.,

South Coast, Natal. "TEOSINTE."

SCAB: ITS NATURE AND TREATMENT.

To the EDITOR of the *Agricultural Journal.*

SIR,—I have read with much interest Mr. A. G. Davison's paper on "Scab: Its Nature and Treatment", read before the Vryburg Farmers' Association and published in the June number of your *Journal.* His experiments with an old infected kraal conducted between August, 1906, and August, 1909, go to prove beyond doubt that the scab *acari* or its eggs retain their vitality for a period of three years, either in the dung or kraal fence or wall. I am rather inclined to the opinion that the insect is capable of not merely living, but breeding in the loose dung. Of course, the dung is not its natural host, and three years may be the limit of its existence under such conditions. But this is not my point. If old kraals and sleeping-places retain the infection for so long a time, how is it possible to clean the country of scab? The recommendation to destroy old kraals and provide clean veld would be right enough if such could be effectually done. Why not use the sheep as a collector of the scab insect, the same as cattle are used to collect ticks? That this can be effectually done I am fully convinced, and will give a few instances to back my opinion. In 1866 I moved on to a farm in the Komgha District. All my neighbours were Dutchmen, all had sheep, and all had scab, some of them to perfection. My sheep were clean, for I had been guided by Yoxett's work on sheep, and had come from a farm near the coast where there were no others farming with sheep. There were no fences in those days; sheep had to be herded and kraaled at night. Sheep mixed while in the veld

and my sheep were soon infected with scab, so I built a dipping tank at once. It was only a wooden one, about fifteen feet in length, but it answered my purpose well There were no patent dips then, but both Boer and Kaffir tobacco were to be had. A thirty or a thirty-five gallon soap pot served to boil the tobacco, bringing it just to the boiling point and then covering it up. Half-yearly shearing was the rule in those days, and after each shearing my sheep were dipped twice; and this tobacco dipping was kept up till Dr. Roe's formula for sulphur and lime was published in the late Mr. Hellier's little paper, the "Farm". I was on that farm for seven years; the same kraals had to be used always, yet my sheep kept fairly clean. If I saw a spot of scab it was attended to at once. There was no reason to suspect at any time that my kraals were a source of infection. The intervals between the dipping served to pick up the stray mites in the loose dung, and no doubt there are always plenty of them where sheep are kraaled. On one occasion a neighbour came over while I was shearing, and expressed astonishment at the quantity of wool I was getting from my limited flock. My reply to him was, "You only shear half a sheep"—the remainder of his wool was scratched off in the veld. In 1889 there was a severe drought, and when the rains came late in the spring there was a severe outbreak of scab in one of my flocks. We knew where it had come from, as I had cut the throat of one scabby ewe—a stranger—and subsequently found another in the infected flock. Two dippings cured those sheep. All my sheep had to come to the same kraal for drafting, etc.—of course they were not kraaled at night, as the farms were fenced—but sheep had to go back on to their own veld, which must have been infected more or less. At one time it was found that the sheep inspectors' areas were too large, so inspectors were appointed for wards. One of my sons was so appointed for two wards. In his area were a number of farms along the Great Kei River, very difficult of approach; one or two had never before been visited by a sheep inspector, and sheep were very scabby. There was a dipping tank, and he lived amongst those sheep till he was satisfied that he had cleansed them; and for two years those sheep remained clean: most of them, I believe, had three dippings. But this goes to prove that the sheep will themselves collect the mites between the first and the second dipping. My nephew, who was in charge of my sheep at Oribe for several years, maintained that with one thorough dipping in lime and sulphur he could cure scab. I had no reason to doubt him, although we always dipped twice. The sheep he was in charge of travelled in both autumn and spring, and although we could keep them clean on the farms, they always picked up scab on the road. Any spot of scab that showed itself when they came down in the autumn was carefully soaked in a strong solution of tobacco extract, and those sheep would return in the spring apparently clean, but before shearing spots of scab would show. These spots were at once treated with tobacco extract; hence the cure with the one dipping, although I never allowed him to trust to it. This was, of course, prior to 1887. I trust that I have made out a case for using the sheep themselves to cleanse both veld and the kraals.—Yours, etc.,

Kei Road, 5th July.

R. WARREN.

STEAM PLOUGHING AND THE MAIZE INDUSTRY.

To the EDITOR of the *Agricultural Journal*.

SIR,—Seating myself this evening in an easy chair after a day in the mealie lands, I picked up the last issue of the South African *Agricultural Journal* and turned to an article headed "Steam Ploughing and the Maize Industry". Well, Mr. Editor, even to the "small farmer" there is a certain amount of interest in the article—quite friendly interest up to a certain point; but towards the end the ideas and opinions set forth on page 99 nearly made me jump out of that comfortable easy chair. Presumably your correspondent wishes to be taken seriously, and I am forced to the conclusion that he has but little knowledge of his subject, so far as the maize industry is concerned, and in defence of the "small farmer's" intelligence, methods, and industry I raise a voice in protest. I must plead the general need of refuting such inaccurate statements and opinions as those set forth by your contributor as my excuse for asking space in your correspondence column for controversial matter.

Presuming that I represent the "small farmer" and mealie-grower class, like thousands of others in South Africa, in that I do not use the steam plough, I, notwithstanding, take strong exception to the ideas set forth on page 99, paragraphs 4, 5, 6, 7, and 8.

Take the first, viz. par. No. 4, commencing "While believing that we, etc."

Well, if Mr. Leonard Acutt is not hopeful that the thousand and one of us small farmers will be a large factor in the future production of maize in South Africa, I, on the contrary, for one, hold the opinion that the multiplicity of "small farmers" (this term meaning any and all of us who do not use the steam plough) is going to be *the* factor in the case. Of course, as the writer says, Vereeniging methods are necessary for Vereeniging results—very true and very logical—but which system, the big man's or the small man's, is going

to be responsible for the bulk of the estimated Transvaal yield this year, viz. 2,394,640 bags? And I base my opinion on the workings of the world's greatest maize-producing country—the United States of America. What of the producers of the 5,535,611 farms of the United States of America (see *American Farm Journal*, July, 1911, page 400) and the 1,336,000,000-dollar crop of 1907? (*Corn*, page 20, Bournan and Crossley). It is not the steam plough that is responsible for the bulk of this output.

Par. 5. "I say only by use of the steam plough, etc."

Much too careless and sweeping an assertion. Mr. Acutt should ascertain a few of the results obtained by progressive farmers in Standerton District, to mention but one locality, before committing himself to such a pronounced statement.

Par. 6. Even weeds require moisture before they are capable of very rank growth, my own experience being that a rain sufficient to give a good growth of weeds is sufficient also to plough on.

Par. 7. Is Mr. Acutt really serious in saying, "And this can only be done by steam ploughing"? I refrain from further comment.

Par. 8. "Groups of farmers, etc. . . . the large expert of mealies, etc. . . . will be the result of large farms and not small ones."

Exactly the reverse of the truth; the history of all countries goes to show that closer settlement increases production.

And the conclusion of the paragraph: "But I am looking, etc. . . . and here farmers certainly are dependent upon rain to enable them to plough their land."

Of course we are. Why not? And I might add that the steam plougher is equally dependent on the same rain to germinate his seed and successfully grow his mealie.

Your contributor appears to have been carried away by the extent of the broad acres and the magnificence of the scale of work at Vereeniging, but such opinions appearing in the Government agricultural publication of the Union need refutation. The idea that the land can only be economically and intelligently worked by the operations of huge concerns, more akin in staff and turnover to a small Rand gold mine than an average farm undertaking, is entirely opposed to modern ideas of land settlement as generally *expressed* in this country and as in operation in other colonies.

Let me now disavow any hostility to the steam plough; granted favourable conditions, suitable land in quality and quantity, proximity to rail line, cheap coal supply, and abundant capital, to mention a few essentials, it can justify itself or the reverse by the final test of a balance-sheet in the same way as any other method of farming. There is plenty of land yet for either individual, company, or co-operative venture, but I emphatically object to being told that only in steam ploughing (par. 5) can we hope for success (good results).

I venture to say that many individual returns per acre by methods of ox or horse traction have been just as satisfactory as the average at Vereeniging, and let me submit the opinion in direct opposition to the views expressed by Mr. Acutt in par. 8—that, broadly speaking, the large production of mealies we may look forward to in South Africa will be the result of, and depend on, the intelligent working of many comparatively small individual farmers, and not the result of the production of large estates of 10,000 acres and upwards.—Yours, etc.,

Vlakfontein, P.O. Balfour, Transvaal, 25th July. JAS. READ.

SMUT IN WHEAT, BARLEY, ETC.

To the EDITOR of the *Agricultural Journal*.

SIR,—I have from time to time and in various journals, etc., noticed correspondence on "How to prevent smut in wheat, barley, oats, etc." I have repeatedly tried bluestone, but without success. However, last year a friend gave me a very simple method, viz.: Heat water to anything above 180°, even to boiling point. Pour a quantity into a bath, tub, or any receptacle which will accommodate half a bag of grain, and reduce the temperature to 135° F. by adding cold water. Plunge your seed (bag and all) into the water (135°) and keep moving. Keep the water at about 133° for five minutes, after which allow the seed to remain in the water for five minutes more (ten minutes in all). It may be sown immediately or dried and stored. After the first plunge the temperature will fall to about 120°, but it must be brought up immediately to 133°. I tried the plan with great success last season.

Will any of your many readers who have perhaps tried this method give us the result of their experience, or perhaps some may be tempted to try it?

I may add that the same water may be used a dozen times, so long as the temperature is right.—Yours, etc.,

Dagga Boer Hoek, P.O. Witmoss Station. S. T. E. MEAKER.

THE SECRETARY BIRD.

To the EDITOR of the *Agricultural Journal*.

SIR,—In the July number of the *Agricultural Journal* Mr. Winsor, of Mosita, writes casting certain reflections on the integrity of the secretary bird, in which he accuses him of immoral practices, eating a hen and a small hare, etc., and not confining himself strictly to his proper avocations, i.e. catching snakes and other poisonous reptiles. Personally, I agree with Mr. Winsor. I look upon the secretary bird as a fraud; he is not what he is cracked up to be! For a hundred years he has been posing as a public benefactor and the friend of man, and got himself protected by law, while all the time he has been surreptitiously gobbling up our young partridges and other game birds. I have narrowly watched him for over sixty years, and have not only never seen him kill a poisonous snake, but never seen him even in possession of a dead one. I once saw what appeared to be a mortal combat between a secretary and some apparently terrible monster; it reminded me of St. George and the dragon. On riding nearer, the secretary seemed delighted for an excuse to fly away, and on reaching the spot I found a small harmless grass snake. Now, I am not sure whether the secretary was trying to catch the snake or vice versa; what I do think was that the secretary saw me passing and seized the opportunity of keeping up his reputation without any risk to himself. I do not wish maliciously to malign the character of so respectable and dignified looking a bird, and hope that some evidence may be brought forward in his defence, but I am afraid that if his good actions were weighed in the balance against his corrupt practices he would be found sadly wanting.—Yours, etc.,

Hiltondale, Rosmead.

F. H. BARBER.

To the EDITOR of the *Agricultural Journal*.

SIR,—A great deal of controversy appears to exist on the question of the usefulness or otherwise of the secretary bird, but without any apparent result, though I have every reason to believe that the greater majority of sportsmen favour the destruction of the bird in question than its preservation, primarily for the reasons which I contributed to the "Game Notes" appearing in the *Transvaal Leader* during April, to the effect that of our natural enemies of winged game we can safely classify *inter alia* the secretary bird. I disagreed with previously expressed opinions as to the secretary bird doing more good than harm, since I repeatedly observed serious destruction wrought by them on young birds and even on young buck.

I have noticed secretary birds in districts where young partridge, pheasants, and guinea-fowl abound and where snakes are less numerous than in other parts which are practically devoid of game. I do not believe in the idea that these birds live principally on snakes and other small vermin, and have come to the conclusion, with little hesitation, that they have most inimical tendencies.

I agree with the remarks by "Austro-Africano" in your last issue; and I think that any protection afforded to these birds should be removed from the Game Laws in the Provinces where penalties are imposed. I understand that the matter is being dealt with by our local game association in this direction, which will no doubt meet with hearty approval.—Yours, etc.,

P.O. Box 212, Pretoria.

J. A. PULLEN.

THE NECESSITY OF WATER CONSERVATION.

To the EDITOR of the *Agricultural Journal*.

SIR,—Having been associated with Queenstown for many years and intimately acquainted with the position and all the conditions connected with their new reservoir, of which they are justly proud, I was struck with the vivid and very graphic description of it which appeared in the *Cape Times* a few days ago. To me it conveyed a great deal, for the reason above specified. What lent it interest was the account of its picturesque surroundings of hill, mountain, vale, and valley with which it is encompassed, and which also forms its gathering grounds, typical of many another site possessing equal, if not greater, facilities. The whole of the drainage area in this instance only comprises forty square miles. I wish readers especially to note this, because this dam (which may be indefinitely extended) is represented to be the largest sheet of artificial water in South Africa, and yet, according to this article, this capacious dam of no loss than 1,500,000,000 gallons of water, with its comparatively small drainage area, has been replenished to the point of overflowing.

If this has happened in a normal year of rain, preceded by a season of drought, the inference is that in an abnormal year when we are visited with floods it could be filled two or three times over, giving some thousands of millions of gallons as a reserve supply in times of great dearth.

Now this account, supported by facts and figures of what might be done to develop our agricultural industries and place the people on the land, is most opportune, coming as it has done on top of the splendid and patriotic act of the Senate in appointing a Committee of their House to investigate this important question of settlements, and a splendid case they have made of it.

Such examples as this of a people driven by circumstances and need to combine in preserving these gifts of nature affords a most valuable object-lesson. It also helps to solve the difficult problem that has so long been agitating the public mind as to our ability to store sufficient water in this country to make settlements a success, except it may be from such sources as the Orange, Vaal, Caledon, Fish, and some of the larger rivers.

This was the view of one or two extreme pessimists, who held that nothing good could come out of Nazareth, and who maintained that it was only possible to form effective irrigation schemes on the two big rivers, and that the only chance of establishing successful agricultural colonies was in well-watered countries. I am not going to review all the evidence, but these statements were controverted by that of Mr. Gordon, who said that even the far-famed Californian fruit region had no rivers, but all the water required for irrigation was carried by flumes from distant rivers or got from wells.

Then we have the evidence of Mr. Kanthack and Mr. Halse with regard to the possibilities of the Indwe scheme, where they have a site for a reservoir capable of containing 6,000,000,000 gallons, but which Mr. Halse, I suppose mistaking Queenstown figures for this, put at 1,300,000,000 gallons. This dam could be replenished by two rivers, the Indwe and Dorne Rivers, one draining an area of 75 square miles and the other 110 square miles. Both these rivers take their rise in the Great Drakensberg, while a third river taking its rise in another range of mountains, could be diverted if necessary.

I may here state that the land involved in this scheme abuts upon native territory which would be largely benefited by the conservation of the waste or flood water, as it could either be reconserved or carried by gravitation.

Not very far off I know of another magnificent site in the Native Territories where water could be conserved at relatively small cost in comparison with the benefits that it would confer. The argument that I hold is that if it is necessary to devise schemes for closer settlement of the whites where we already have nine-tenths of the land, is it not equally necessary that some such provision should be made for them in their more densely congested centres ?

We may ignore the fact and we may legislate as we like about restricting natives to their own territories, but with their much more rapid increase, and as partners with ourselves in this sub-continent, we will be bound in the near future to consider the economic conditions of their country. This as much for the sake of their salvation as our own security. Besides this, are they not producers as well as consumers with growing wants as civilization advances ? I would like to point out how all these native territories are deteriorating through erosion, all of which is helping to impoverish the country, for we must try and look at the country as a whole.

But time will not permit and I want to substantiate my facts with regard to our neglected opportunities.

Mr. Du Toit, Under-Secretary for Agriculture, when questioned upon our agricultural possibilities for future development, instanced several very desirable schemes that might be inaugurated with great advantage to the country, and one in particular where a huge tract of country in a desolate region could be brought under the beneficial influence of irrigation.

It was no doubt very rich land, as the Karoo generally is, containing all the inherent properties that would make it valuable, only awaiting the application of water to make it fruitful. This reminds me of Mr. Gordon's further evidence, in which he tells the Committee of a single scheme inaugurated by the New South Wales Government at a cost of £1,600,000,000 (one thousand six hundred millions). This was built in an arid region and had the effect of sending up the price of land from 20s. an acre to from £80 to £90 per acre. Edgar Allen Forbes, the author of "The White Helmet: The American Travellers in Northern Africa", gives an instance where land in Egypt was enhanced by 1000 per cent. after the completion of the great Assuan Dam, which shows that, no matter how costly such an undertaking may be to a nation, it sometimes proves to be the most profitable investment they can make. In this case we know how the creation of this great work saved the country from absolute ruin and has left them with a handsome surplus.

One is always afraid of taking up too much space, so that you can only glance at the evidence in this invaluable report, but the consensus of expert opinion is that if a consistent and economic conservation policy is adopted throughout the Union, we will not only in a short time be able to grow sufficient for our own consumption, but largely for export too.

Mr. Gustav Baumann, late Surveyor-General of the Free State, who, to judge him from his writings and from his intimate knowledge of the whole topography of the State,

must be an authority upon its agricultural capabilities, in his evidence told the Committee that there were large tracts that lent themselves extremely well for the purpose of extensive irrigation works. He further observed that if these were started the land could be made to support scores more people than at present, and the production would be increased accordingly. Asked to give an instance, he mentioned one case where between 100,000 to 120,000 acres can be brought under irrigation immediately below the dam, which he said he had not the least doubt could be replenished by the Riet River.

This brings me back to the Queenstown reservoir. As I wish to illustrate this, I must crave indulgence for a little more space. Because when these possibilities are mentioned and we draw comparisons between India, Egypt, Australia, or Canada and ourselves and what they would do under our circumstances with a £6,000,000 bill to foot for imported foodstuffs, our pessimists immediately say: "Oh! but the same conditions do not prevail that you find in these countries. We have no Himalaya Range, with its melting snows; no Nile, with its annual floods; no Goulburn, with its great volume of water from the interior, to replenish these mighty structures." True; we do not aim at these collossal undertakings, but is that not all the more reason why we should, by every means in our power, try to capture the blessings that Providence sends us, and thus, at least, remove the reproach of our incapacity to feed ourselves. That is not all, but by preserving our resources as far as possible it may to a very large extent enable us to avert the terrible death-roll among our stock that periodically sweeps the country when the dry cycles set in.—Yours, etc.,

Tantallon House, Rondebosch.

E. R. BRADFIELD.

SORE TEATS.

To the EDITOR of the *Agricultural Journal.*

SIR,—With regard to the letters from Messrs. R. Thompson and J. J. van der Merwe referring to sore teats, I wish to give you the following remedy:—Take two parts of old cream, one part of brandy, and mix thoroughly. After milking, when the calf has finished sucking, rub the teats well with this mixture, and within a few days the teats will be all right again.—Yours, etc.,

Nieuwjaarspruit, Wepener, O.F.S.

W. J. DU PLESSIS.

Questions and Answers.

These pages will be devoted to questions, and an endeavour made to reply to all inquiries upon agricultural topics of general interest, or concerning any of the articles published from time to time in the *Journal*. In all cases replies will be posted to correspondents so soon as same have been procured.

Correspondents are requested to write on one side of the paper only. No manuscript will be returned.

All letters must be addressed to the Editor of the *Agricultural Journal*, Department of Agriculture, Pretoria.

CURDLING OF NEW MILK IN BOILING.

F. C. Motham, P.O. Box 2103, Johannesburg, asks :—Would you be kind enough to give me your opinion of the cause (and cure) of the curdling of new milk when boiling. The milk was from a cow about three months off next calving time, and was boiled about an hour after milked. The cow appears healthy and is fed on a mash of bran and little mealie meal, and manna, dry lucerne, green barley, and runs also on the veld.

Answer.—The Acting Superintendent of Dairying replied :—I am afraid that it would be impossible to give you either the cause or the cure of the milk from your cow curdling when boiled an hour after being milked, unless investigations were made on the spot and the milk subjected to a bacteriological examination. It is quite an unusual thing for milk to curdle when boiled so soon after milking, unless it happened to be milk from a newly calved cow or milk containing over a certain percentage of acidity. Assuming that your milk was sweet at the time of boiling, it points to something being wrong, quite out of the ordinary known causes. I would therefore advise you to send a small bottle of the milk addressed to Dr. Theiler, Government Bacteriologist, Onderstepoort, Pretoria, for examination. The food you are giving your cow is quite good, and if you want to vary same (which is a good thing) you could substitute the bran mash with crushed oats.

VROEGEBAARD WHEAT.

A correspondent asks where seed of Vroegebaard wheat can be obtained. If any readers can supply the desired information, together with quotations, it will be esteemed. [9264].

JAGTZIEKTE IN SHEEP.

A. J. Barlow, Frankfort, District Boshof, Orange Free State, writes :—As I am troubled and have been for some considerable time with a form of lung-sickness in my sheep and have tried various remedies but without avail, I am writing to see if you can help me. The disease appears mostly amongst young ewes, but occasionally amongst older ewes. They begin to fall off and gradually waste away until they die, just as with consumption in human beings. On opening after death the lungs are found to be hard, enlarged, white in colour, and grown on to the ribs ; some also have diseased livers, and the bowels are yellow-coloured in places.

Mr. D. J. du Plessis, Nieuwjaarspruit, Wepener, Orange Free State, makes a similar inquiry.

Answer.—The Veterinary Division (Transvaal) replied :—There is strong evidence that in certain conditions jagtziekte is infectious or contagious, but all attempts to communicate it artificially by inoculation of the blood with inflammatory products from the lungs have failed. It is supposed that this disease has some connection with cold and wet, appearing especially during the winter months, but there is every reason to believe that, in addition to this, another condition is required, although so far this has not been traced. Jagtziekte is a pneumonia—that is, an inflammation of the lungs, but of a peculiar character. Treatment is not of much avail. As jagtziekte may be infectious, the affected animals should be isolated, but the most profitable way of dealing with it is to slaughter the animals as soon as the presence of the disease can be detected—while they are in good condition. The meat is perfectly wholesome, as the disease is confined to the lungs.

INCONTINENCE OF URINE IN COW.

J. W. Lotz, West Krugersdorp, writes:—I have a cow; she was in calf and then by accident she was served by another bull; since that time she has been languishing and her water is continually dropping. I have had twice some stuff from the chemist, but it has not done any good. Please let me have your advice.

Answer.—The Veterinary Division (Transvaal) replied:—It is just possible that the second bull, when making a connection with the cow, injured the neck of her bladder; at least, the fact that her water is continually dropping would point to this injury, one which it is difficult if not impossible to relieve. The cow should be kept quiet, and not syringed in any way. Possibly with time and patience she may come all right.

WINTER GRASSES.

In reply to a correspondent seeking advice regarding winter pasture grasses, the Government Botanist wrote as follows:—I recommend *Paspalum dilatatum* for the vleis and tall fescue (*Festuca arundinacea*) for the upper lands, provided the ground is not too sandy and dry. For the dry sandy soils, sheep's burnet (*Sanguisorba minor*) is the best with an admixture of lamb's tongue (*Plantago lanceolata*). The seeds of all of these may be obtained from local seedsmen. With regard to paspalum, it is true that it does not remain green during the coldest weather, but it is the last grass to turn brown in the winter and the first to become green in spring. It is of special value in swampy ground because it stands flooding and chokes out the coarser grasses. Tall fescue keeps green all the winter and continues to grow during our coldest weather provided it has a certain amount of moisture in the soil. I do not know what your friend refers to under the name of "Canada rooi grass"; it is probable that I know the grass, but not under this name. I am not aware that it has been tried here, and it would not be wise to go in for it till it has been tested. In any case, tall fescue, burnet, and paspalum meet possible requirements in your part of the country, and I should advise planting them in preference to other things. But you might try a little phalaris and perennial ryegrass to see how they answer.

CLEANING TEFF SEED.

W. D. McIntyre, Witfontein, P.O. Meyerton, writes:—Kindly inform me what number of mesh would be suitable for sifting teff seed from pigweed and other foreign seeds. I have seen the paragraph on page 602 of the *Journal*, but am anxious to avoid the expense of purchasing a patent machine. I am informed that the first prize teff seed at the last Johannesburg Show was cleaned entirely with a sieve, and I am confident that no patent winnower could do better.

Answer.—The Government Botanist replied:—I understand that the teff seed in question was not cleaned by sifting but by hand-winnowing on a quiet day. The freedom from mist-breede seed (*Amarantus paniculatus*) is due to the fact that the growers sent their boys through the field reserved for seed, some time before harvesting, and carefully hand-weeded for any stray mist-breede plants. When teff grass is sown thickly, i.e. at the rate of 7 to 10 lb. per acre and care is taken to sow evenly, there is usually little or no trouble with weeds. A good deal depends, however, on the treatment of the soil at the time of sowing. It is necessary to sow at the time of the last harrowing, or, to put it the other way, to harrow at the time of sowing. Some farmers have been known to leave their sowing until a week or ten days after the harrowing, with the result that the weed seeds have had a start of the teff seed, and it has then become impossible for the teff plants to smother the weeds; if both have had an equal start, and if sufficient teff seed is used, the latter makes an excellent smother crop, scarcely any weeds being able to beat it.

BEANS FOR THE FREE STATE.

M. E. Emmerson, P.O. Don Don, Orange Free State, asks for advice as to two of the best kinds of beans for the Orange Free State, and where seed is obtainable.

Answer.—The Acting Under-Secretary for Agriculture, Bloemfontein, replied:—Canadian Wonder and Early Runner are among the best varieties. A limited quantity of seed can be supplied by the Department of Agriculture, Bloemfontein.

POTATO QUERIES.

J. C. Summers, P.O. Box 52, Boksburg, writes:—I have at present seed potatoes planted in January (imported seed Early Rose) still in the ground; do you think it wise to dig them and replant them again at once, or do you think it better to leave them for a period, and, if so, for how long a period? Also, is it best to put them in a dark room or an open and well-ventilated shed? I have a large heap of wood and coal ashes—most coal ashes; do you think it would be good to mix with kraal manure for potatoes, and do you think coal-dust is good to mix with kraal manure for potatoes?

Answer.—The General Manager, Experiment Farm, Potchefstroom, replied:—Assuming that it is desired to plant the potato crop in August or September, I would advise raising the present crop for seed purposes about the end of this month, so that the "seed" can be stored and hardened for two or three weeks before planting. Do not store the seed in a dark room; spread it out thinly on a dry floor in a well-lighted shed. In regard to wood and coal ashes, there would be a certain amount of potash in both, but in each case the manurial value would be small unless the ash were very fine, i.e. completely burnt out. The coal-dust would be of no value.

POULTRY.—BEST LAYING BREEDS.

M. van der Merwe, Senekal, writes:—On page 604 of your last issue (English) the Poultry Expert says that Wyandottes, Orpingtons, and also Plymouth Rocks are the best laying breeds. Now I ask you whether this information is not contrary to the facts?. On page 593 of the same *Journal* I see with regard to the third egg-laying competition in the Western Province the following results:—

Nos. 1 to 12, Leghorns; No. 13, Andalusians; Nos. 14 and 15, Leghorns; Nos. 16 to 18, Wyandottes; No. 19, Leghorns; Nos. 20 and 21, Wyandottes; Nos. 22 to 32, Leghorns; No. 33, Wyandottes, etc.

In No. 42 come the first Orpingtons, and no breeder has had the courage to enter Plymouth Rocks. We know that facts speak for themselves and also that experience is the best teacher, and therefore I cannot agree with the expert's answer.

Answer.—The Poultry Expert replied:—Correspondent does not appear to have read the whole of my answer on page 604 of the *Union Journal* for May, 1911, for I distinctly say that "these may not produce quite so many eggs as the Leghorn or Ancona, but they lay better during the cold weather". I naturally take it for granted that every farmer knows that eggs produced during the cold weather, say in May and June, are of far more value than those laid in the spring, i.e. September and October; in fact, one egg laid during May and June is worth nearly three laid in September and October, not only from the market point of view—for fresh eggs on the Potchefstroom market to-day are 2s. 9d. to 3s. 6d. per dozen, whereas in October they are worth 1s. to 1s. 3d. per dozen—but also because one pullet hatched during May, June, or July is worth three hatched during October, November, or December, for the early hatched birds are laying at the season when eggs are most valuable, whereas late hatched birds will not lay until towards the end of winter when eggs are falling in price; further, winter hatched chickens always grow out better and make larger birds than those hatched during the later months. I would further refer to the results of the laying records obtained on the Experiment Farm, Potchefstroom (see page 108 of the February number of the *Union Journal*), by which you will see that the White Wyandottes and the Buff Orpingtons take the first and second places, Silver Wyandottes are sixth, White Orpingtons eighth, and Plymouth Rocks ninth, the latter breed being handicapped owing to the death of one bird twenty-four days before the end of the period for which records were kept. Further, the question of climate is an important one. The climate at Rosebank is not, I should say, so severe as in many of the inland districts, and this would naturally be a point in favour of the non-sitting varieties. Again, the competition covered a period of twelve months, which gives the non-sitting varieties an opportunity to make up for the lost time while the heavy breeds are broody, and in my answer to which reference is made I do not say that the heavier breeds will always lay the most eggs—the question rather is as to *when* the eggs are laid. There is another very important point which has apparently not been noticed, but which I mention, i.e. "a great deal depends upon the strain; there are good and bad laying strains of all breeds", and this possibly accounts for certain breeds figuring at the top and also very near the bottom in some of the laying competitions, the winner naturally being of a good laying strain, whilst those in the rear-guard are of a poor laying strain. In the many laying competitions that have been held in the various parts of the world during the past few years the heavy breeds have, I think, proved themselves, for they generally figure either at the head of the list or very near to it. I quite agree that experience is the best teacher, but you are taking your basis from the laying competitions at Rosebank, which is only one of many which have been held in the various countries within the past few years, and only proves that poultry breeders in the Cape have good Leghorns, but that there is room for considerable improvement in their heavier breeds.

MEALY BUG IN GRENADILLAS.

T. A. Binks, P.O. Box 41, Randfontein, asks:—Will you kindly inform me what to do with a grenadilla vine which is blighted and under the leaves of which are groups of little insects, grey in colour and in a sort of whiteish down. The leaves turn yellow and die; and as I do not wish to have the whole vine die which is about 70 feet, I shall be obliged if you can suggest something either in a spray or otherwise.

Answer.—The Government Entomologist (Transvaal) replied:—These insects are the mealy bug (*Dactylopius spec.*). They have often been reported on grenadillas and other plants. These insects are covered with a fluffy exudation which often gives the infested plants an appearance of being covered with meal, hence the name "mealy bug". By reason of this fluffy exudation these insects are well protected, and it can therefore be understood that several thorough sprayings are necessary to make an impression on this pest. A solution of one part of tobacco extract in seventy-five parts of warm water put on the infested plants in a fine misty spray with a certain amount of force, has been found to give good results.

INCUBATION OF OSTRICH EGGS.

Edmund Dundas, Carlton, Addo, Cape Province, asks:—(1) In incubating ostrich eggs, what are the maximum rise and fall for safety—that is, above and below the normal temperature? (2) Is cooling of the eggs daily a necessity? (3) Can you advise any small book on incubation

Answer.—The Government Agriculturist (Cape) replied:—(1) In incubating ostrich eggs a *safe* maximum temperature may be taken at 105 degrees with a minimum at 93 degrees. This is allowing for a normal temperature from 98 to 102 degrees. The safe maximum and minimum temperatures referred to above may be continued for not longer than a few hours, but if the temperature is maintained for any longer period it will be attended with much danger. There have been instances where eggs have cooled to the same temperature as the outside air and remained so for twelve hours, and also where they have gone up as high as 108 degrees for the same period of time, and the chicks have come out alive, but such experiments are very dangerous, and would certainly be fatal if attempted during the first twenty-one days of incubation.

(2) The daily cooling of eggs is necessary, the usual practice being to cool for ten minutes both morning and evening at the beginning of incubation, turning the eggs on both occasions. The period of the cooling operations is increased from twenty to thirty minutes, twice daily later on. Attention must be given, however, to the state of the weather. The periods just mentioned are given effect to in normal weather, but it will be necessary to regulate the time according to the outside temperature.

(3) There is no literature on ostrich rearing generally that has been published in this country, but you will find useful information in regard to incubating in a book on the subject written by Hearson, obtainable, I understand, from Messrs. Clarke Bros. and Brown and doubtless other publishers in the country.

LIME-CLOGGED PIPES.

"Correspondent" writes:—I have 1500 feet of inch pipes, which are practically useless to me, as they are all clogged up with lime. The spring-water has such a great percentage of lime that these pipes had been rendered useless in a very few years' time. Could you or any of your readers be so kind as to inform me (*a*) how these pipes could be cleaned? (*b*) if not, for what purpose these pipes could be used? By so doing you will greatly oblige me.

Answer.—This correspondent omitted to forward his name, but as the question he asks affects many people in the dry sections of South Africa, the usual rule is abrogated and an answer published. There are ways of cleaning such pipes, but none, so far as we are aware, are of a practical nature in "Correspondent's" circumstances. A dilute solution of hydrochloric acid will slowly dissolve out accretions of lime, but the cost is against such a procedure in this case, so it would not be economical. Beside that, it is very doubtful whether this method would be really practicable in such a length of piping of so small a diameter as an inch. The only other course open would be to dismantle the piping and bore the lime out mechanically. It is, therefore, apparent that the easiest and cheapest method in the end is to use the pipes as long as possible and renew when necessary. The old pipes would not be worth much, but if well clogged they might be useful, cut in desired lengths, as fencing standards or supports for trellises, etc.—Ed. *A. J.*

TANK DIMENSIONS FOR IRRIGATION PURPOSES.

T. H. Matthews, District Willowmore, Cape Province, writes:—I intend to put up a wind pump for irrigation purposes, and shall have to build a tank to store the water. Will you please inform me what size tank I should require to hold sufficient water to irrigate one morgen of ground at a time?

Answer.—The Director of Irrigation replied:—The irrigation of one morgen of land requires 21,780 cubic feet of water; this is equivalent in amount to three inches of rain. Tanks of the following dimensions will contain the necessary quantity of water:—

Length.	*Width.*	*Depth.*
74 feet.	74 feet.	4 feet.
60 feet.	60 feet.	6 feet.
53 feet.	53 feet.	8 feet.

The capacities of the reservoirs can be reduced to one-half by halving any one dimension or to one-quarter by halving any two dimensions.

POULTRY QUERIES.

F. J. P. Walker, Bethlehem, writes:—I am, besides my other stock, a bit of a poultry fancier, and have gone in for the Silver Grey Dorking. I happened to be unfortunate with the pen I got (which was from Natal), the two hens taking roup and dying when I had only two dozen eggs. Since then I have lost an occasional bird, and I presume it must be roup; the last birds just pined away and died mere skeletons. I burned the carcasses myself to make quite sure of eradicating the disease, and now I see that one of my Dorking pullets has roup. I would also mention that I have the whole poultry run swept out once a week and disinfect the house once a month with strong Little's dip. Can you suggest what I should do to get the disease out of my yard? My Dorking hens which died had roup, but I do not understand what my four common hens died from, as I saw no signs of roup—they simply wasted away and it only struck me to-day when I saw another pullet ill and found it to be diphtheritic roup that probably the others that wasted away might have died of the same. How should I give lime to the fowls? Just get a bucket of slaked lime and mix with water and fine gravel and put into the yard? I would be very glad to hear the Poultry Expert's opinion on how to get rid of the roup.

Answer.—The Poultry Expert (Transvaal) replied:—I am afraid that you have made rather an unfortunate selection in buying Dorkings, for I have never heard of any one succeeding with this breed in either the Transvaal or Orange Free State in spite of the fact that many—myself included—have given them a trial. Why they should not thrive here is hard to say, but that is the opinion of all who have kept them. I do not think that death was due to roup, but from your description should say that the birds had what is known in poultry parlance as "going light", which may be due to either tuberculosis or consumption, but in either case I can give you no cure, for both diseases are incurable and will probably be inherited by the progeny. You can give lime to the birds by means of oyster shells, lime mortar from an old building, or you can thoroughly slake half a bucket of ordinary lime and place it in the run.

CURING LOOFAHS.

"S.", Kingwilliamstown, asks for a recipe for curing loofahs—i.e. preparing them for toilet purposes.

Answer.—The Government Botanist replied:—The "loofah" of commerce is prepared from the fruit of *Luffa aegyptiaca* and consists of the network of fibres existing in the interior of the fruit. The fruits should be allowed to remain on the vines until they have acquired a yellowish tint, but not until they have begun to assume a brown colour, as this indicates that the outer skin of the gourd is undergoing decay, which will cause the fibrous structure within to become discoloured. The fruits should be cut from the vine with about two inches of stem attached, for convenience in hanging. They should be hung in an airy, draughty shed for two or three days, and the outer skin will then be found to be fairly soft and pliant; this stage of the preparation is assisted by cutting off the tip of the gourd at the lower end, leaving a small hole through which the contained moisture may drip. The loofahs may next be removed by running the finger down the skin of the fruit on one side, splitting it open and turning out the loofah, which is at once thrown into a washing vat containing limewater (5 lb. of slaked lime to 50 gallons of water). The loofahs are stirred about in the limewater for a few minutes and are then removed to a draughty shed to dry. Care should be taken to shake the limewater out of each loofah before drying. If the loofahs are dried too quickly they are apt to become brittle and crack; they must not, however, remain damp too long, or they become mouldy, though the lime prevents this to a large extent and is, indeed, used in order to protect them from fungoid growths. When the loofahs are dry the seeds may be easily shaken out of them by hand, and when this has been done they are ready for the market.

CLEANING PIPES OF OIL ENGINE.

N. J. Oosthuizen, Drooge Kloof, P.O. Klaarstroom, Prince Albert, asks:—Will you be good enough to tell me what I must do to clean the pipes of my oil engine. The sediment of the brackwater attacks the pipe and jacket in such a manner that the water cannot properly circulate for cooling the piston. The water of the borehole contains a great quantity of sulphur.

Answer.—The Director of Irrigation replied:—The chief cause of such a large quantity of sediment settling in the water jacket and circulating pipes of oil engines is that most people allow the engine to become overheated, with the result that the water leaving the jacket is almost boiling, which causes a heavy deposit to be left in the jacket and circulating pipes. The water leaving the jacket should not exceed 120° Fah. When it is impossible to obtain a constant supply of water into the circulating tanks it is advisable to arrange two or more tanks suitably connected so as to have a large volume of water for cooling. To clean the sediment out of the water jacket and pipes it is necessary to disconnect the circulating pipes from engine, loosen joints and scrape out sediment with pieces of hoop-iron or wire. Most oil engine makers provide blank flanges on the side of cyclinder casing for the purpose of cleaning out the jacket; these should be taken off occasionally and the deposit cleaned out.

COTTON.

J. S. Cameron, Bertrams, 34A Derby Road, writes:—(1) Is the Transvaal in and around Johannesburg suitable for growing of cotton? (2) If so, which is the best district? (3) Which is the best cotton to grow? (4) What is about the return per acre? (5) Does it require any special knowledge? (6) How long does it take to mature? (7) Has it to be planted yearly? (8) Does it require much water? (9) What is the best fertilizer to use, if any?

Answer.—The Chief of Tobacco and Cotton Division, replied:—(1) and (2) Rustenburg is the nearest locality to Johannesburg where cotton experiments have been conducted by this Division. These experiments have proved that the district in question is well suited to the crop, provided early varieties are cultivated and the seed sown with the early spring rains. (3) American upland varieties (Annuals) have given the best results even in the low veld where it is possible to cultivate the perennial varieties. Of course the high veld, including the Rustenburg District, would not be suitable for perennial on account of the winter climate being too severe. (4) As regards the return per acre, the average yield of lint per acre should be about 250 to 300 lb. or even more, and the product, at present market value should be worth about 7d. to 9d., and even 1s. per lb., provided of course proper methods are applied. At 5d. per lb. the crop should realize about £5 per acre. (5) No special knowledge is required to make cotton growing a success. In fact it may be said that the crop is one of the easiest to raise. (6) Seven to eight months from the time of sowing until the last picking is ready. (7) The cotton plant in its natural state is of course a perennial, but the bulk of the world's supply, which comes from the Southern States of the United States of America, is grown as an annual. Much may be said for both perennials and annuals, but we are inclined to favour annuals for the Transvaal. (8) An average rainfall of 30 inches or more should prove sufficient, provided no long period of drought is experienced. (9) As a general fertilizer formula, having no particular soil in view, I would recommend one carrying 3 per cent. nitrogen, 3 per cent. potash, and 9 per cent. soluble phosphoric acid.

S. H. Boyle, Maboki, Bushbriek Ridge, Pilgrims Rest, asks:—Can you tell me anything further about the Cotton Harvesting Machine? Our labour is bad—worse than last year—and costly.

Answer.—The Chief of the Tobacco and Cotton Division replied:—The cotton harvester will hardly be a paying proposition in this country for some time to come, unless enormous strides are made and the acreage under cultivation increased to a very great extent. There are indications, however, that such a satisfactory state of affairs may eventuate at no very distant date. The harvester is a 30-h.p. machine, and although the Department does not yet know the price of it, it is thought it will cost close on £1000. In the United States of America it is being worked by commercial houses, and a harvester is sent around to the cotton plantations of the Southern States, and after harvesting the crop on one plantation it passes on to the next plantation and so on. With the present output of cotton here it will be seen that the proposition just at the moment could hardly be considered a paying one. It is suggested that natives be paid so much per bag for cotton picking. If this can be done the advantages are obvious, for then it will be known exactly what it is going to cost to harvest the crop. A maid sack will hold about 50 to 60 lb. of seed-cotton, and it is suggested that 6d. per sack be paid, which would be about 2s. per 100 lb. The labour of native women and picanins can well be utilized for this purpose and the cost is not high. In the United States of America, 50 cents per 100 lb. of seed-cotton is the usual price paid for picking.

Notes on the Weather.

CAPE PROVINCE (MAY, 1911).

By CHARLES M. STEWART, B.Sc., Secretary, Meteorological Commission.

MEAN barometric pressure slightly higher than the normal; days cooler, but nights milder than the average; skies cloudier than usual, with a low fog-frequency; an abundant rainfall, about one-third in excess of the average; thunderstorms, mostly local, and but little hail; light falls of snow and sleet at a few of the higher stations; winds light and much more variable than usual, but with an excess of southerly breezes over the South-west and westerly over the greater portion of the rest of the country; an unusually small number of strong winds; some hot winds about the middle of the month, and frosts confined almost wholly to the last few days. These were the leading features of the weather of May, 1911.

Division.	Mean Rainfall (1911).	Mean No. of Days.	Average Rainfall (1891–1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	4·84	8	4·80	9	+ 0·04	+ 1
South-west	3·62	6	2·90	7	+ 0·72	+ 25
West Coast	1·46	4	1·51	5	+ 0·05	— 3
South Coast	3·70	8	2·36	6	+ 1·34	+ 57
Southern Karoo ...	3·56	7	0·99	4	+ 2·57	+ 260
West Central Karoo	1·59	7	0·85	3	+ 0·74	+ 87
East Central Karoo	0·90	6	0·79	3	+ 0·11	+ 14
Northern Karoo ...	1·23	5	0·85	3	+ 0·38	+ 44
Northern Border ...	1·39	4	0·62	3	+ 0·77	+ 124
South-east	3·13	9	1·35	5	+ 1·78	+ 132
North-east	1·35	7	1·02	4	+ 0·33	+ 32
Kaffraria	2·15	9	1·10	4	+ 1·05	+ 95
Basutoland	2·28	8	1·38	4	+ 0·90	+ 65
Orange Free State ...	1·97	6	1·04	3	+ 0·93	+ 89
Durban (Natal) ...			1·79			
Bechuanaland ...	1·88	7	0·50	1	+ 1·38	+ 276
Rhodesia	1·62	7	0·45	1	+ 1·17	+ 260

Precipitation during May was fairly uniformly distributed over the whole country and considerably in excess of the average over practically all the divisions, the mean, as shown by returns from 318 stations, being 2·51 in. on seven days, being 0·70 in., or 39 per cent., in excess of the usual depth. (If the returns for 134 stations in the Orange Free State be included, the mean is reduced to 2·35 in. on seven days.) The accompanying table shows that the mean sectional rainfall was practically normal over the West Coast and the Cape Peninsula, but considerably in excess of the average elsewhere, the Northern Border, Bechuanaland, and Rhodesia being favoured with unusually abundant late rains. The actual means varied from 0·90 in. over the East Central Karoo to 4·84 in. over the Cape Peninsula. The departures from the normals ranged from minus 3 per cent. over the West Coast to plus 276 per cent. over Bechuanaland, and plus 260 per cent. over the Southern Karoo and Rhodesia. The Northern Border and the South-east Divisions also had considerably more than double the usual amounts. The general distribution of these late rains is well brought out on summarizing the monthly totals of the 452 stations, from which it is seen that no station reported "absolute drought" during the month, and only 12 had 0·01–0·50 in.; 58 had 0·51–1·00 in.; 172 had 1·01–2 in.; 110 had 2·01–3 in.; 43 had 3·01–4 in.; 27 had 4·01–5 in.; 7 had 5·01–6 in.; 10 had 6·01–7 in.; 7 had 7·01–8 in.; 5 had 8·01–9 in.; whilst the maximum amount of 10·62 in. was recorded at Grootvader's Bosch, in the South Coast Division. Those exceeding 8 in. were Elgin (Plantation), 8·49 in.; Swellendam, 8·58 in.; Stellenbosch, 8·79 in.; Evelyn Valley, 8·97 in. Out of 315 stations furnishing particulars of the daily intensity, 85 had 0·01–0·50 in. as the maximum amount in 24 hours; 113 had 0·51–1·00 in.; 72 had 1·01–2 in.; 19 had 2·01–3 in.; 14 had 3·01–4 in.; 7 had 4·01–5 in.; 4 had 5·01–6 in.; and Stellenbosch had 7·00 in. between 12.15 p.m. on the 19th and the morning of the 20th. The next largest amounts were 5·88 in. at Elgin (Plantation); 5·20 in. at the Lower Reservoir (Capetown); 5·05 in. at Caledon; and 5·03 in. at Dwarsriviers Hoek, in the Stellenbosch Division, all on the 19th. As a result of these late rains over the country the veld is unusually green and in excellent condition, ploughing was being carried

on, and there seemed to be every prospect of a good winter. Crops already in the ground were looking well, and the yield of mealies at Sunnyside (Hay) was reported to have been very good so far. The only discordant note proceeds from Herschel, where the mealies and kaffir-corn being gathered in were reported as bad. At Armadillo Creek (Vryburg) the soil is stated to be soaked for over a foot down, so that larvae and pupae of various pests hatching out may be killed off by succeeding frosts. *Thunderstorms*, although more numerous than during the corresponding month of last year, were considerably less in number than during the previous month, 125 being noted on 25 days of the month. These storms were mostly local in character, except on the 26th, when a fairly large area was affected, and the 10th, when a much more limited number of stations was affected. *Hail* fell at 8 stations on 20th, 21st, 26th, and 27th. Slight showers of *snow* fell at Lauriston (Barkly East) on 26th, and at Tent Kop (Maclear) on 27th, 28th, and 31st, the ground being white on the 28th. *Sleet* was noted at 10 stations on 7 days.

Temperature, Cloud, and Wind.—The mean temperature of all stations was 57°·4, or 4°·8 cooler than the previous month, and 0°·9 below the mean for May, 1910. The mean maximum (67°·5) was 5°·5 lower than in April, and 2°·6 below that for May of the preceding year; but the mean minimum (47°·3), whilst 4°·0 lower than the corresponding value for the preceding month, was 0°·6 higher than during May of last year. Compared with the averages, the mean temperature of the month was 0°·8 below the average, the day temperatures being 2°·1 lower and the night temperatures 0°·4 higher than usual. The mean daily range was reduced to 20°·2. With a few exceptions, the monthly temperatures at the individual stations were above the average in the West, South-west, and South by 1–2°, but below the normals in the East and in the interior 1–4°, the deficits being least (about 1°) over the High Veld, and increasing to 2–3° over the South-east and Kaffraria. The largest excess was 2°·4 at Capetown and Cape St. Francis, and the greatest deficit was 4°·3 at Hopefountain (Rhodesia), and Teyateyaneng (Basutoland). These differences in mean monthly temperature are mainly due to the day temperatures, which were higher than usual by approximately 1°·5 to 3°·5 over the West, South-west, and South, and below the averages elsewhere commonly by 3–6°, but varying between 2°·2 at Kimberley and Dunbrody to 8°·8 at Teyateyaneng (Basutoland), the deficits over the eastern half of the country being mostly between 4–6°. In the case of the night temperatures the differences were much smaller, being commonly in excess of the average by about 1° at stations on or near the coast in the West and South-west, and about 2° along the South Coast, but below the normal by amounts ranging from one or two tenths to slightly more than 2° over the eastern and central portions of the country. Excess of night temperature was common to more than two-thirds of the stations, the greatest surplus amount being plus 2°·6 at Cape St. Francis, and the largest deficit, minus 2°·6, at Hanover. The mean warmest station was Cape St. Francis, with 65°·2, and the mean coldest, Hanover, with 46°·6, a difference of 16°·6. The highest mean maximum (74°·2) belongs to Dunbrody, and the lowest mean maximum (32°·5) to Hanover. The highest temperatures during this month were recorded during two warm spells from 1st to 5th, and from 13th to 19th, also on 25th; the first affecting stations principally in the East and Centre, and the second places in the West, South, and parts of the South-east. Except in Namaqualand, where the extreme minima for the month were registered on 1st to 3rd, the coldest spell was from 26th to 31st, more particularly the mornings of the 28th and 29th. The mean value of the highest day readings was 81°·7, or 3°·0 lower than during May, 1910, and of the lowest night readings 38°·0, or 6°·3 lower than during the corresponding period of the previous year. The mean monthly range was, therefore, 43°·7. The highest temperature recorded during the month was 92°·5 at Capetown on the 14th, and the lowest (25°·0) at Aliwal North on the 30th, showing an extreme monthly range over all stations of 67°·5. *Frosts* were confined to a few stations on 2nd, 3rd, and 7th, and from 11th to 16th, but were of wider occurrence from 22nd to 31st, more particularly on the 29th and 30th. These low ground temperatures were more numerous than last month, and slightly in excess of those during May of last year, being noted at 69 stations on the 19 days already mentioned. At Retreat, in the Cape Peninsula, the mean minimum temperature on grass was 42°·1, or 6°·2 lower than the shade minimum. Although the mean was only 0°·1 lower than in May of last year, the temperature fell below freezing-point (32° F.) on three occasions, being 30°·1 on 7th, 28°·1 on 12th, and 28°·3 on 28th, whereas it touched freezing-point on only one morning of the previous May. The highest reading of this thermometer was 57°·7 on 20th.

The mean percentage of *cloud* was 44, the same as in April, but 7 per cent. more than in May of last year. It was fairly uniformly distributed over the various sections of the country, being commonly from 40 to 55 per cent., but varying from 25 per cent. at O'okiep to 66 per cent. at Port St. Johns. *Fogs and mists* were noted at a few stations from 1st to 13th, 16th to 23rd, and from 25th to 31st, but were most numerous on 2nd, 11th, 21st, and 30th. *Winds* during this month were much more variable than usual, being distributed over all points of the compass at most stations, but showing on the whole an excess of southerly winds over the Cape Peninsula, easterly in Namaqualand, westerly along South Coast, north-westerly in the eastern portions of the country as well as at Durban (Natal),

and east to north-east over the more northerly parts of the interior, and south-east at Hopefountain. These winds were unusually light, the mean *force* being only 1·56, corresponding to a velocity of 6·7 miles per hour, or 0·3 miles per hour less than last month, and 0·4 miles per hour less than during May, 1910. They were strongest in the South-west and South, and lightest in the Central parts. At the Royal Observatory there was a decreased frequency of all winds between N. and NE., and between NW. and SSW., but a slight excess of southerly, south-easterly, and north-north-westerly breezes, and a large increase in the number of calms, which was also characteristic of the other stations. The mean velocity there was 5·2 miles per hour, or 0·8 miles per hour less than usual. *Strong winds and gales* were much less frequent than usual, being reported as occurring at only 9 stations on 7 days from 17th to 22nd and on 30th. Thirteen instances of *hot winds* were reported on 7 days, principally about the middle of the month, occurring on six successive days at Uitenhage. No *duststorms* noted.

The mean pressure at the Royal Observatory was 30·12 in., or 0·02 in. higher than usual, ranging from 30·35 in. on the morning of the 31st to 29·88 in. on the morning of the 18th.

TEMPERATURE.

Station.	Mean Max.	Mean Min.	Mean	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory	69·8	51·6	60·7	89·8	14th	41·5	28th
Capetown(SouthAfricanColl.)	72·0	51·8	61·9	92·5	14th	43·0	28th
Capetown (Hospital)	69·9	52·6	61·2	90·2	14th	46·1	28th
Bishopscourt	69·5	47·3	58·4	87·0	14th	39·5	27th
Groot Constantia	69·0	52·5	60·8	87·0	14th	46·0	26th
Retreat	72·2	48·3	60·2	90·5	15th	34·7	28th
Wynberg	71·5	50·9	61·2	89·0	15th	42·0	28th
Blaauwberg	67·9	53·1	60·5	89·2	15th	46·0	27th
Danger Point	66·5	53·9	60·2	81·0	18th	45·0	27th
Elsenburg (African College)	71·3	51·7	61·5	88·8	14th	42·8	27th
Ookiep	69·0	50·1	59·6	78·5	3rd	42·0	1st
Port Nolloth	67·4	49·0	58·2	92·0	13th & 16th	40·0	2nd & 3rd
Uitenhage	72·3	47·8	60·0	82·3	14th	35·0	29th
George (Plantation)	68·2	52·4	60·3	84·5	14th	44·0	28th
Cape Agulhas	66·6	55·2	60·9	89·0	16th	47·0	27th
Port Elizabeth	71·3	53·5	62·4	86·0	15th	46·0	29th
Dunbrody	74·2	46·7	60·4	84·3	17th	35·7	30th
Mossel Bay	70·0	52·3	61·2	87·0	16th	44·0	28th
Heidelberg	72·0	46·7	59·4	89·0	19th	37·0	28th
Cape St. Francis	69·9	56·6	63·2	86·0	18th	44·0	29th
Storms River	69·4	51·2	60·3	85·7	14th	43·6	29th
Amalienstein	69·7	44·8	57·2	83·0	14th	35·0	29th & 30th
Hanover	60·7	32·5	46·6	69·0	4th	26·0	22nd & 30th
Murraysburg	61·1	37·8	49·4	69·0	2nd	29·0	27th, 28th & 31st
Kimberley	66·4	42·4	54·4	80·0	4th	32·1	30th
Sydney's Hope	67·2	51·0	59·1	77·0	15th	45·0	6th, 27th & 31st
Cathcart	61·0	44·1	52·6	70·2	3rd	33·8	29th
Kingwilliamstown	70·0	47·1	58·6	80·0	18th	38·0	28th & 19th
Lovedale	67·1	47·0	57·0	77·0	18th	36·0	29th
Evelyn Valley	58·6	45·9	52·2	75·0	1st	38·0	30th
Aliwal North	64·1	37·7	50·9	76·5	4th	25·0	30th
Queenstown	64·8	40·1	52·4	74·0	4th	30·0	29th
Kokstad	62·3	37·6	50·0	72·0	25th	25·1	29th
Umtata	68·9	47·0	58·0	80·0	3rd	40·0	26th
Main	65·1	45·4	55·2	75·2	3rd	35·2	29th
Tabankulu	65·1	43·1	54·1	73·8	25th	34·5	29th
Teyateyaneng	58·7	37·4	48·0	71·0	4th	29·0	29th & 30th
Mochudi	71·0	45·0	58·0	88·0	3rd & 4th	32·0	31st
Hopefountain	68·9	48·5	58·7	78·3	5th	39·5	30th
Bloemfontein	59·6	40·8	50·2	71·3	4th	31·5	30th
Means	67·5	47·3	57·4	81·7	—	38·0	—
Extremes	—	—	—	92·5	14th	25·0	30th

OBSERVERS' NOTES.

Vruchtbaar (Wellington).—First part of the month exceptionally dry weather and no ploughing could be done. The rains of the 18th to 20th were fine soaking rain, and the soil in best of condition for all work. All crops very promising.

Kruis River (Uitenhage).—Have had some very warm days this month, succeeding heavy dews. Less rain has fallen here this year from 1st January to 31st of this month by nearly 3 in. than we had for the corresponding period of last year. A good deal of ploughing still remains to be done, ground yet requiring more rain. Present crop of barley, barley-wheat, etc., look well. Stock well. Have had one sharp frost on the 29th.

Uitenhage Park.—A variable month. Seven hot winds—six in succession. Frost first observed on 29th. Rainfall slightly over average of nine years, but a decrease of 2·06 in. on corresponding month of 1910.

Rydale (Aberdeen).—Veld in grand order. Lambs splendid, and prospects very good for the kidding.

Theefontein (Hanover).—Dense fog on 1st and 10th. Light frosts in early part of month and sharp towards end. Heavy mist on 22nd, with cold north-west wind. Veld fine and all stock in first-class condition. Every prospect of a good lambing season. Rainfall light, but considerably more than for corresponding month of last year.

Waverley (Queenstown).—No wind this month.

Sunnyside (Hay).—The fine rain of the 18th has done a lot of good to the bushveld, and so all stock are in splendid condition; there seems every prospect of a favourable winter. Mealie harvesting in full swing, and so far the yields have been very good.

Clifton (Sterkstroom).—Splendid rains; excellent for ploughing. Veld practically green.

Herschel.—No crops except mealies and kaffir-corn, which are bad and are being gathered in.

Sunnymeade (Albert).—Still very wet after the soaking rains in previous months. Stock improving, although winter has set in with very sharp frost.

Armadillo Creek (Vryburg).—Frost on 30th April did damage to late mealies, etc. Such a wet May is very unusual. The soil is soaked for over a foot down, and pupae and larvae of most pests—caught napping—will probably germinate and be followed by premature death.

Nottingham (Mafeking).—The rains have been unusually late this year. The weather has been warm and mild. First heavy frost on night of 28th.

Kokstad (Cape).—Less rain fell than is usual in May. The monthly mean temperatures were considerably below this month's average, but no frosts occurred until late in the month, and grass is unusually green in consequence.

TRANSVAAL.

OBSERVERS' WEATHER REPORTS FOR JUNE.

BARBERTON DISTRICT—

Sheba Queen Mine.—Weather generally cold and dry, very little dew being observed. (W. Stenhouse.)

Cairn.—On the morning of the 28th there was a severe frost. Native trees were slightly burnt, and mangoes, guava, and citrus trees were tipped by frost. (T. S. Watkinson.)

White River.—Slight frosts on 28th and 29th, cutting down tomato plants and potatoes. (E. Owen.)

BETHAL DISTRICT—

Leeuwkuilen.—The weather has been very variable, the winds being choppy, westerly and south-westerly winds having prevailed. On the 2nd and 3rd of the month we had a bitter cold drizzle, the stock suffering a lot. For five days at the latter end of the month we had bitter cold windy days. The ground thermometer registered 18·5 degrees of frost on the 28th morning. (W. J. Wayland.)

BLOEMHOF DISTRICT—

Katrina.—A nice rainfall for this time of year. Cold nights with sunny days; exceptionally cold from the 24th to end of month. (P. Lombard.)

CAROLINA DISTRICT—

Waterval Boven.—The beginning of the month was nice and warm. Only the last few days were extremely cold. (J. C. Borcherds.)

ERMELO DISTRICT—

Ermelo.—The weather has been exceptionally cold, with heavy frosts during the latter part of the month. Winds chiefly light, and from west or east. (A. Drummond.)

De Hoop.—We have experienced an exceptionally cold month and hard frosts have been the rule, whereas usually frosts here are not very frequent. Potatoes have been cut down where previously they have always done well. (Capt. C. W. Alston.)

LYDENBURG DISTRICT—

Graskop.—Frosts were prevalent during the month, whilst strong winds were experienced at times. (G. Irvine.)

Belfast.—Severe frosts during the month. The hardest frost was on the morning of the 29th, when 26 degrees were registered on the ground. The month has been cool; highest maximum reading was 64·2 degrees in the screen. (G. J. Imrie.)

MARICO DISTRICT—

Enzelsberg.—The cold south-east winds during the last week in this month did some damage to the crops and also pulled down the cattle. On the morning of the 29th the minimum thermometer registered 23 degrees, a record for Enzelsberg. (J. C. Swart.)

MIDDELBURG DISTRICT—

Middelburg.—The weather during the past month of June has been in every respect in conformity with that usually experienced here following seasons of low rainfall—that is, clear, bright days with cold nights and little wind. The degrees of frost, amounting to as much as 12 in the thermometer screen and probably 16 or 18 on the ground, are usually excessive after little rain. The mean temperature for the month has been unusually low. (Dr. H. A. Spencer.)

PRETORIA DISTRICT—

Wagendrift.—Frost has done much damage on 23rd and 24th. (F. Garforth.)

STANDERTON DISTRICT—

Beginsel.—Latter part of month very cold. (A. Wilson.)

WAKKERSTROOM DISTRICT—

Wakkerstroom.—Very severe frosts during this month. (W. Pritchard.)

WITWATERSRAND DISTRICT—

Florida.—Heavy frosts during the month. (A. Lockie.)

ZOUTPANSBERG DISTRICT—

Pietersburg.—Heavy fall of frost nightly; bitterly cold mornings, merging into warm brilliant days. (W. Frankleyne.)

Machutiesberg.—Frost has been prevalent during the latter end of this month, slight damage being done to potato crops in places, but not severe enough to damage bananas and other vegetation. Owing to the late rains in May, grass burning in the low country has been prevented; thus we derive no warm atmosphere from them as usual. (J. McCallum.)

Louis Trichardt.—The wettest May on record at this station has been followed by the coldest June, the mean minimum temperature being 40·1 or 4·8 degrees lower than the average for the preceding five years. Ground frosts were observed on the mornings of the 12th, 24th, 27th, 28th, 29th, and 30th, whilst the minimum thermometer in the screen showed five degrees of frost during the night of the 27th. Winter crops of beans and other vegetables have been destroyed, but peach trees already in bloom have not been affected. (Sergeant J. C. N. Clark.)

Rainfall for June, 1911.

CAPE PROVINCE.

I. CAPE PENINSULA :	*Inches.*
Royal Observatory (*a*) 12-inch gauge	4·55
Capetown (South African College)	5·15
Do. (Molteno Reservoir)	4·91
Do. (Platteklip)	6·67
Do. (Signal Hill)	2·30
Do. (Hospital)	2·95
Sea Point (The Hall)	2·48
Camps Bay	3·36
Table Mountain (Disa Head)	5·67
Do. (Kasteel Poort)	9·28
Do. (Waai Kopje)	10·33
Do. (St. Michael's)	11·12
Bishopscourt	5·56
Kenilworth	6·31
Wynberg (St. Mary's)	4·67
Groot Constantia	6·09
Tokai Plantation	3·51
Muizenburg (St. Res.)	3·31
Cape Point	1·20
Blaauwberg Strand	1·68
Robben Island	1·68
Maitland Cemetery	1·06
Tamboers Kloof	4·30
Woodhead Tunnel	7·27
Lower Reservoir	5·11
"acLear Beacon	10·84
Waai Vlei	11·13
Woodhead Dam	8·99
Retreat	3·34

II. SOUTH-WEST :	
Klapmuts	3·65
Stellenbosch (Gaol)	3·57
Somerset West	2·93
Paarl	4·21
Wellington (Gaol)	3·10
Groot Drakenstein (Weltevreden)	4·8[illegible]
Porterville Road	2·66
Tulbagh	2·48
Kluitjes Kraal	3·46
Ceres	5·97
The Oaks	1·75
Rawsonville	1·40
Caledon	2·41
Worcester (Gaol)	0·58
Hex River	0·74
Karnmelks River	2·82
Lady Grey (Division Robertson)	0·79
Robertson (Gaol)	0·60
Do. (Govt. Plantation)	0·73

II. SOUTH-WEST (*continued*) :	*Inches.*
Montagu	1·21
Danger Point	2·09
Elsenberg Agricultural College	3·44
Roskeen	2·60
Vruchtbaar	3·68
Ceres (Heatlie)	5·68
Waverley (Tulbagh)	2·17
Dwaars Riviers Hoek	6·96
De Doorns	0·75

III. WEST COAST :	
Anenous	0·79
Klipfontein	2·26
Kraaifontein	0·90
Concordia	1·55
Garies	0·53
Van Rhyn's Dorp	0·48
Dassen Island	0·71
Kersefontein	0·90
The Towers	1·40
Malmesbury	1·70
Piquetberg	2·05
Wupperthal	0·58
Hopefield	1·10
Algeria (Clanwilliam)	2·54
Cedarberg (Clanwilliam)	2·96

IV. SOUTH COAST :	
Cape Agulhas	1·86
Swellendam	2·37
Grootvaders Bosch	3·36
Heidelberg	2·04
Riversdale	2·25
Vogel Vlei	1·63
Mossel Bay	1·32
Great Brak River	1·69
George (Plantation)	2·16
Millwood	3·56
Plettenberg Bay	2·81
Harkerville	4·20
Blaauwkranz	3·14
Storms River	3·60
Witte Els Bosch	5·00
Cape St. Francis	4·40
Van Staaden's (Intake)	4·57
Kruis River	1·87
Uitenhage (Gaol)	1·82
Do. (Park)	1·52
Do. (Inggs)	1·79

IV. SOUTH COAST (*continued*):	*Inches.*
Armadale (Blue Cliff)	1·53
Dunbrody	1·49
Port Elizabeth (Harbour) ...	2·02
Do. (The Slip) ...	1·57
Do. (Walmer Heights)	1·58
Shark's River (Nursery)... ...	1·57
Centlivres	1·41
Edinburgh	4·03
Gamtoos Station	2·25
Zoetendals Vallei...	2·20

V. SOUTHERN KAROO:	
Triangle	0·66
Pietermeintjes	1·50
Ladismith	1·34
Calitzdorp...	0·45
Oudtshoorn	0·85
Vlaakte Plaats	1·65
Uniondale...	2·26

VI. WEST CENTRAL KAROO:	
Beaufort West (Gaol)	0·56
Dunedin	0·44
Nels Poort	0·47
Camfers Kraal	0·34
Krom River	0·11
Roosplaats	0·15
Lemoenfontein	0·54
Willowmore	0·39
Rietfontein	0·38
Steytlerville	0·11

VII. EAST CENTRAL KAROO:	
Aberdeen (Gaol)	0·19
Aberdeen Road	0·00
Klipplaat	0·27
Winterhoek	0·86
Kendrew (Holmes)	0·42
Graaff-Reinet (Gaol)	0·67
Do. (Eng. Yard) ...	0·59
New Bethesda	0·50
Glen Harry	0·59
Wellwood	0·40
Bloemhof	0·39
Jansenville	0·33
Roode Hoogte	1·06
Klipfontein	0·40
Somerset East (Gaol)	0·70
Spitzkop (Graaff-Reinet) ...	0·97
Villeria (Aberdeen)	0·39
Grobbelaars Kraal	0·57

VIII. NORTHERN KAROO:	
Sutherland	0·97
Fraserburg	0·42

VIII. NORTHERN KAROO (*continued*):	*Inches.*
Carnarvon	0·23
Brakfontein	0·32
Victoria West	0·30
Wildebeestkooy	0·53
Murraysburg	0·89
Hanover	0·14
Theefontein	0·39
Philipstown	0·15
Petrusville	0·00
Colesberg	0·15
Culmstock	0·16
Cradock (Gaol)	0·15
Maraisburg	0·25
Steynsburg (Gaol)	0·50
Tarkastad	0·76
Drummond Park	0·65
Schuilhoek	0·27
Vosburg	0·45
Zwavelfontein	0·39
Zoetvlei (Richmond)	1·54
Klipkraal (Richmond)	1·00
Hotweg Kloof (Cradock) ...	0·42
Thebus Waters	0·44
Ruightersfontein	0·34

IX. NORTHERN BORDER:	
Kenhardt	1·15
Upington	0·80
Trooilapspan	1·25
Van Wyks Vlei	0·53
Prieska	1·21
New Year's Kraal	1·25
Dunmurry	1·28
Karree Kloof	1·10
Douglas	0·84
Douglas (Vos)	0·81
Hopetown	0·49
Newlands (Barkly West) ...	0·82
Barkly West	0·86
Kimberley (Gaol)	1·00
Strydenburg	0·45
Stoffkraal (Prieska)	1·95
Sunnyside (Hay)...	1·01
Rocklands	0·80
Peters Park (Gordonia)	1·61
Sydney-on-Vaal	0·93
Warrenton	0·85

X. SOUTH-EAST:	
Melrose (Division Bedford) ...	0·38
Dagga Boer	0·34
Alicedale	1·35
Bedford (Gaol)	1·12
Do. (Hall)	1·04
Sydney's Hope	2·22
Cullendale	0·80
Adelaide	0·62

X. SOUTH-EAST (*continued*):	*Inches.*
Atherstone	1·78
Alexandria	2·77
Fort Fordyce	1·20
Grahamstown (Gaol)	2·32
Heatherton Towers	1·05
Sunnyside	1·95
Fort Beaufort	0·34
Katberg	0·49
Seymour	1·20
Glencairn	1·11
Port Alfred	3·90
Hogsback	1·87
Peddie	1·84
Keiskamma Hoek	0·96
Cathcart (Forman)	0·28
Cathcart	0·76
Thaba N'doda	1·60
Evelyn Valley	2·44
Crawley	0·00
Pirie Forest	1·17
Forestbourne	1·67
Isidenge	2·16
Kologha	0·58
Kingwilliamstown (Gaol)	0·35
Do. (P'ym)	0·67
Fort Cunynghame	0·42
Kubusie	1·58
Quacu	0·26
Blaney	0·15
Bolo	0·25
Komgha (Gaol)	0·52
Chiselhurst	0·53
East London East	0·63
Cata	0·82
Wolf Ridge	1·14
Dontsah	0·66
Mount Coke	1·10
Albert Vale (near Bedford)	0·58
Huxley Farm	0·23
Amabele Junction	0·32
Insileni	0·34
Eastover	1·23

XI. NORTH-EAST:	
Venterstad	0·29
Mooifontein	0·26
Burghersdorp (Gaol)	0·58
Lyndene	0·63
Thibet Park	0·66

XI. NORTH-EAST (*continued*):	*Inches*
Sterkstroom (Station)	0·15
Rocklands	0·33
Aliwal North (Gaol)	0·34
Poplar Grove	0·10
Jamestown	0·10
Queenstown (Beswick)	0·39
Herschel	0·55
Lauriston	0·45
Lady Frere	0·20
Contest (Near Bolotwa)	0·17
Keilands	0·11
Barkly East	0·30
Hughenden	0·22
Indwe	0·15
Clifton	0·29
Edendale	0·10
Avoca (Barkly East)	0·98

XII. KAFFRARIA:	
Ida (Xalanga)	0·61
Slaate (Xalanga)	0·42
Cofimvaba	0·45
Tsomo	0·32
N'qamakwe	0·48
Main	0·24
Engcobo	0·28
Butterworth	0·18
Woodcliff	0·32
Kentani	0·14
Maclear	0·28
Do. (Station)	0·36
Bazeya	0·91
Willowvale	0·60
Somerville (Tsolo)	0·24
Elliotdale	0·47
Umtata	0·47
Cwebe	0·11
Tabankulu	0·50
Kokstad	0·15
Do. (The Willows)	0·27
Flagstaff	0·45
Insikeni	0·30
Port St. Johns	0·41
Umzimkulu	0·12
Umzimkulu (Strachan)	0·13
Lusikisiki	0·28
Tentkop (Elands Height)	0·09
Kilrush	0·10

NATAL.

Winkel Spruit	0·12
Mount Edgecombe	0·16
Cornubia	0·32
Saccharine	0·13
Milkwood Kraal	0·21
Blackburn	0·55
Cedara (Hill)	0·25
Do. (Vlei)	0·17
Giant's Castle	Nil
Weenen	Nil

TRANSVAAL.

	Inches.		*Inches.*
Barberton	Nil	Klerksdorp	0·21
Komatipoort	Nil	Pretoria (Arcadia)	Nil
Lothal	0·06	Modderfontein	0·06
Christiana	0·65	Rustenburg	Nil
Carolina	Nil	Standerton	Nil
Ermelo	Nil	Mbabane	Nil
De Hoop	0·01	Volksrust	Nil
Vereeniging	0·01	Wakkerstroom	0·02
Heidelberg	Nil	Potgietersrust	Nil
Lichtenburg	0·04	Krugersdorp	Nil
Pilgrims Rest	0·15	Joubert Park	Nil
Belfast	Nil	Johannesburg (Observatory)	Nil
Zoerust	0·01	Wolmaransstad	0·46
Middelburg	Nil	Pietersburg	0·03
Piet Retief	Nil	Louis Trichardt	0·33
Potchefstroom	Nil	Leydsdorp	Nil

Departmental Notices.

FARM EMPLOYMENT.

MR. E. SHARRATT, Brakwal, P.O. V. K. Kop, District Harrismith, Orange Free State, has a vacancy for an apprentice on his farm, where both general and stock farming are carried on. Youngish lad preferred, and one not afraid to work. [6]

Englishman, 19 years old, recently arrived in this country, desires employment on farm. Is strong and healthy and used to hard work.—ERIC SMITH, P.O. Box 1432, Capetown. [6]

Scotch tenant farmer, with life experience of pedigree and prize stock, desires management of stud or stock farm, or to assist on large ranch. Especially desirous of getting into touch with person wishing to import Clydesdales. Eight years in Africa; retrenched from Government service: testimonials and references: age 45; not married.—Apply A. W. DORMAN, Wessels Nek, Natal. [7]

Applicant, married, age 40, desires situation as farm manager. Fifteen years' experience in Natal—stock and agriculture. Proficient in dairy work and management. Good references.—"C", P.O. Box 17, Potchefstroom, Transvaal. [8]

Scotchman, married, 28 years of age, eleven years' experience of mixed farming and wattle growing in Natal, desires situation as manager on farm.—R. G. H., c/o Lake Hotel, Mooi River, Natal. [8]

NOTICE No. 617 OF 1911.

TENDER FOR STEAM PLOUGHS, TRAILERS, AND OX WAGONS.

Tenders are hereby invited for the purchase of the undermentioned commodities from the Department of Agriculture.

Sealed tenders, superscribed "Tender for the purchase of Steam Ploughs, Trailers, and Ox Wagons", must be addressed to the Chairman of the Tender Board, P.O. Box 376, Pretoria, and must be in his hands by 12 o'clock noon on Wednesday, the 30th day of August, 1911.

The steam ploughs were imported from Messrs. John Fowler & Co., Leeds, and Messrs. Aveling & Porter. The trailers were used in connection with the steam tractors, and the ox wagons have been converted into trailers.

Certain of the steam ploughs will only be available on the completion of their existing engagements, but some of them, as well as the trailers and the ox wagons, can be delivered upon the acceptance of the tender.

Particulars as to the make and cost of the ploughs, etc., the districts in which they are working, and the date upon which they can be delivered, can be obtained upon application to the Acting Under-Secretary for Agriculture, Pietermaritzburg, who will also arrange for the inspection of the machines, etc.

Purchasers will be required to take delivery of the ploughs, etc., at the places where they are at present working.

Payment may be made in twelve equal quarterly instalments bearing interest at 4 per cent. per annum, the first payment to be made on the acceptance of the tenders, but adequate and approved security for the due payment of the instalments must be furnished.

Any further particulars may be obtained upon application to the Acting Under-Secretary for Agriculture, Pietermaritzburg.

The Board reserves the right of accepting any portion of a tender without the whole and does not bind itself to accept the highest or any tender.

W. H. GILFILLAN,
Deputy-Chairman of the Tender Board.

Tender Board Offices,
Pretoria, 21st July, 1911.

GOVERNMENT NOTICE.

VACANT APPOINTMENTS—TRANSVAAL.

It is hereby notified for general information that the undermentioned positions are vacant, and applications for the same will be received by the Acting Secretary for Agriculture, Pretoria, up to 12 noon, on Wednesday, 16th August, 1911.

Successful applicants will be required to enter into the usual three years' agreement, and if they do not possess a knowledge of the Dutch language on appointment, they will be required to learn it within a reasonable period.

(1) LECTURER IN VETERINARY SCIENCE.

Applicants must be members of the Royal College of Veterinary Surgeons, England, or hold an equivalent degree, and in addition to being capable of teaching Veterinary Science, should have experience in Veterinary practice. Salary, £350 per annum, rising by annual increments of £20 to £450, plus quarters for a single man, or £8 per mensem in lieu thereof for a married man, until such time as a house can be provided.

(2) LECTURER IN FIELD ENGINEERING.

Applicants must have a good theoretical and practical engineering training and be capable of

(1) giving instruction in land surveying and building construction;

(2) supervising and instructing students in the carpenter's and blacksmith's shops;

(3) conducting trials of agricultural implements and machinery;

(4) giving practical and theoretical instruction and demonstration of farming irrigation methods.

(5) conducting and recording the results of experiments to determine the amount of water used or necessary for the maturing of crops.

Salary £350 per annum, rising by annual increments of £20 to £450, plus quarters for a single man, or £8 per mensem in lieu thereof for a married man, until such time as a house can be provided.

(3) LECTURER AND INSTRUCTOR IN DAIRYING.

Applicants must be capable of lecturing to students on the scientific principles underlying the practice of dairy work as well as giving practical instruction thereon, and have a thorough knowledge of the management of dairy stock and experience in the control of a farm dairy. Salary £250 per annum, rising by annual increments of £10 to £300, plus quarters for a single man, or £8 per mensem in lieu thereof for a married man, until such time as a house can be provided.

School of Agriculture, Potchefstroom.

RESULTS OF DIPLOMA EXAMINATIONS, 1911.

The first examinations for the Diploma of the School were held recently, and the results of the examinations are appended, together with the regulations for the passing of the examination and obtaining the Diploma. Seventeen students sat for the examination in Part I; eleven of these were successful. In Part II, sixteen students sat for the examination; nine of these were successful in passing in all subjects, and thus obtaining the School Diploma. Four students are required to take special subjects again and three students must take the entire part again.

The following is a list of the successful candidates:—

Part I (in alphabetical order):—N. Barendregt, Guy Davies, R. K. Fletcher, C. Hardman, J. Malan, J. Marks, J. A. Nellmapius, C. A. Pereira, Chas. Preddy, G. H. Rissik, W. L. Worden.

Part II (in alphabetical order):—E. Biccard, E. Biermann, N. Johnston (with distinction in Botany and Veterinary Science), C. Lewis (with distinction in Entomology), H. Michaelis, E. Muhl, E. Quilliam (with distinction in Entomology and Veterinary Science), H. W. Ruscoe (with distinction in Botany, Entomology, and Veterinary Science), H. S. Woolf (with distinction in Botany, Entomology, Agricultural Chemistry, and Veterinary Science).

REGULATIONS FOR THE DIPLOMA.

The following are the regulations for the passing of the examination and obtaining the Diploma :—

(1) The course will extend over two years.

(2) The examination must be taken in two parts as follows :—

Part I at the end of one year's residence :

(1) Agriculture, including Poultry Work, Horticulture, Surveying, and Book-keeping.
(2) Botany.
(3) Zoology.
(4) Chemistry.
(5) Geology and Meteorology.

Final examination at the end of two year's residence :

(1) Agriculture, including Stock-breeding and Management, Dairying and Agricultural Economics.
(2) Agricultural Engineering, including Blacksmithy, Carpentry, and Building Construction.
(3) Agricultural Botany.
(4) Agricultural Entomology.
(5) Agricultural Chemistry.
(6) Veterinary Science.

(3) The maximum number of marks obtainable, and the minimum number of marks in each subject qualifying for the Diploma, will be as follows :—

Part I.	*Maximum.*	*Pass.*
Agriculture, etc.	300	150
Botany	100	40
Zoology	100	40
Chemistry	100	40
Geology and Meteorology	100	40
Part II.		
Agriculture, etc.	300	150
Agricultural Engineering, etc.	100	40
Agricultural Botany	100	40
Agricultural Entomology	100	40
Agricultural Chemistry	100	40
Veterinary Science	100	40

(4) In order to pass the candidate must obtain an average of not less than 50 per cent. of the total maximum marks, and at least 50 per cent. in Practical and Scientific Agriculture.

(5) A candidate who obtains not less than 60 per cent. of the aggregate maximum marks in the subjects other than Agriculture will receive a First Class Diploma, provided that he obtains not less than 75 per cent. of the maximum marks in the subjects included under Agriculture.

(6) A candidate will not be entitled to take both parts of the examination at one time, except under very special conditions.

(7) A candidate who fails to obtain pass marks in more than one subject in Part I must take the entire part again. A candidate who fails in one subject only may sit again for that subject alone. A candidate who fails to obtain pass marks in more than two subjects in Part II must take the entire part again. A candidate who fails in one or two subjects only may take those subjects again.

(8) Weekly and terminal examination marks will be taken into account, and any student whose marks are unsatisfactory will not be entitled to receive his Diploma.

(10) Where applicable the examinations will be conducted by means of practical and oral examinations as well as written papers, and practical farm work throughout the course will be taken special account of in awarding diplomas.

A practical book signed by officials and staff certifying that all farm operations have been properly carried out must be submitted to the examiners.